Dietary Pattern and Nutritional Status

Of Post Menopausal Women in Coimbatore

Kavi Priya, T

(12PFN007)

Thesis submitted to

Avinashilingam Institute for Home Science and Higher Education for women, Coimbatore – 641 043

In Partial Fulfilment of the requirement

For the Degree of

Master of Science in Food Science and Nutrition

March, 2014

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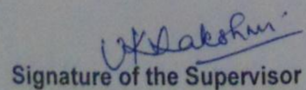

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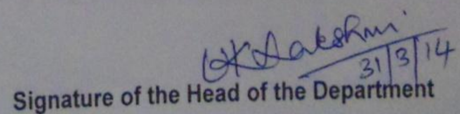

Signature of the Head of the Department

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INTRODUCTION

I.INTRODUCTION

"A woman is the full circle. Within her is the power to create, nurture and transform."

- ***Diane Mariechild***

A woman is the epitome of love, sacrifice, care and ability to nurture life. She is equally an image bearer of God (*Higgins,2010*). Woman is in no way inferior to her counterpart, man.Down the ages woman were not given their due respects yet they went on without complaints. Since time immemorial they had powers to bring a change. As the Chinese proverb says ***"Women hold up half the sky"*** they fought with all odds to emerge as a winner. History is replete with examples of courageous women like Lakshmibai, Indira Gandhi, Hellen Keller and so on.

A major civilization transformation has taken place throughout the 20th century which resulted in the empowerment of women together with the recognition of women's rights as human rights. 8th of March is universally acknowledged as International Women's Day which means that the woman of today has come of age and wants to lead a dignified life of equality with man. The slogan raised today by the women of the world is ***"Equality, Dignity and Self-Respect is what we want***". This slogan is indicative of the new awareness among women the world over. Modern women have raised their voices against the male dominated and feudalistic society. (www.indiaparenting.com)

The life cycle of women includes childhood, then adolescence with the start of her menstrual cycle, followed by her fertile years where pregnancy is a possibility, and ending with menopause where she can no longer get pregnant. The cycle is documented as birth, puberty, menstrual cycle, pregnancy or infertility and menopause (Christiane Northrup, 2010).

Menopause is a universal event for women. It is a developmental milestone in women's health - like puberty in reverse – and it is different for every woman. The word menopause comes from Greek words; **menos** or "***month***" and **pausis** or "***cease***". At menopause, ovarian function declines, menstruation cycle stops, and the monthly spike of reproductive hormone recedes (www. womentowomen.com). Menopause is the permanent cessation of menstruation resulting from the loss of follicular activity of the ovaries. It is a stage when the menstrual cycle stops for longer than 12 months and there is a drop in the levels of estrogen and progesterone, the two most important hormones in the female body (World Health Organization [WHO], 1996).

Menopause is divided into three phases – peri-menopause, menopause, and post-menopause. Peri-menopause is the time when hormones begin to change, ovulation and periods become erratic, and the negative effects of menopause start – hot flashes, insomnia, mood swings, and dry vaginal tissue, to name a few. Menopause defines the period when a woman has been period-free for one year. The negative effects of menopause can continue for up to three years after menopause occurs, and can be a significant problem to a woman's quality of life (www.healthcentral.com)

Post Menopause is the stage following menopause and generally starts between 24 and 36 months after a women's last period. Outwardly, the most marked difference between menopause and post menopause is the reduction in symptoms - for instance hot flashes are less frequent and not as powerful. A woman is also considered post menopausal after the removal of the ovaries because it effectively ends menstrual bleeding.

A reliable indicator of the onset ofpost menopause is the follicle stimulating hormone (FSH). Found at the base of the brain, the pituitary gland produces FSH. When women transition into post menopause, FSH will be extremely high, indicating that ovaries are beginning to shut down.

Estradiol, a form of estrogen, decreases in post menopause when the ovaries are no longer producing eggs. This decrease in estradiol is in turn causes the increase in FSH. The follicle stimulating hormone attempts in vain to stimulate egg production. Basically, this means the end of periods, fertility, and menopause. While the ovaries begin to shrink after menopause, they are still very important to the body. Vital hormones such as testosterone are produced by the ovaries. Female testosterone is a vital hormone for maintaining sex drive, bone and muscle strength, and energy. Many post menopausal women begin to see a relief from menopause symptoms at this time (www.bodylogicmd.com*).*

The onset of this physiological development not only marks the end of women's reproductive function but also introduces them to a new phase of life. Although menopause is a universal phenomenon, there is a considerable variation among women regarding the age of attaining menopause and the manifestation of menopausal signs and symptoms.

Some women may progress through menopause without incident, whereas others may experience symptoms that produce concern and result in health care visits. Menopause is also a time when women can focus on their health and lifestyles and make changes that will decrease the chances of developing chronic illnesses (Fantasia and Sutherland, 2014).

The age at which a woman starts having menstrual periods is also not related to the age of menopause onset. Most women reach menopause between the ages of 45 and 55, but menopause may occur as earlier as the 30s or 40s or may not occur until a woman reaches her 60s. As a rough "rule of thumb," women tend to undergo menopause at an age similar to that of their mothers (Shiel,2013).

The average age of menopause in the western world is 51 years while as in India it is 44.3 years and the normal age range for the occurrence of menopause is somewhat between the age of 45 and 55.

A natural or physiological menopause is that which occurs as a part of a woman's normal aging process. It is the result of eventual atresia of almost all oocytes in the ovaries. This causes an increase in circulating Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) levels as there are a decreased number of oocytes responding to these hormones and producing estrogen (Kamla-Raj, 2011).

During the transition to menopause, women may experience vasomotor, urogenital, psychosomatic and psychological symptoms, as well as sexual dysfunction. The prevalence of each of these symptoms related to menopause varies across ethnic and socioeconomic groups and between rural and urban women (Bernis and Rener, 2007).

The physical changes that occur during and following menopause are due to the low supply of estrogen and progesterone, the long-term changes a woman experiences following menopause include poor skin elasticity, poor memory function, decreased muscle strength and tone, compromised bladder function and increased risk for urinary tract infections, vision problems and weight gain. Additionally, vaginal dryness and changes in sex drive can make sexual relations difficult. Because each woman is individual, these symptoms will vary (Bronwyn Ellison,2010).

Menopause is characterized by physiologic and psychosocial changes in a woman's life. It may be associated with vasomotor symptoms (VMS; hot flashes and night sweats), bone loss, urogenital atrophy, urinary tract infections and incontinence, increased cardiovascular risk, somatic symptoms, sexual dysfunction and decreased libido and loss of skin elasticity. It is also a time of significant **psychosocial changes** for women (e.g. changes to their maternal role resulting from children leaving home) (**Wulf**, 2005).

The most prevalent physical and psychological symptoms are depressive mood, irritability, joint pain, tiredness, and vasomotor and sexual symptoms (Genazzan*et al.*, 2006).Menopause brings many unwelcome changes to women's skin.

Menopausal changes and the symptoms which result from them are natural and experienced by all women to a greater or lesser degree, they may cause distress and reduce quality of life for many women. While many symptoms of menopause are temporary (e.g. hot flashes) changes to sexual function which occur at menopause are typically permanent .
(Walbank, 2010)

Aging and the loss of endogenous estrogen production after menopause are accompanied by increases in blood pressure, contributing to the high prevalence of hypertension in older women. The high prevalence of obesity, the lack of regular physical exercise, and dietary salt are important factors contributing to and aggravating postmenopausal hypertension (Barton and Meyer,2009).

All these, psychological and physiological changes have an impact on food intakeand food choices of menopausal women. It is an established fact that a well balanced diet isimportant for good health and to combat some of the complications of menopause to certainextent. Apart from a nutritious diet an active life style which includes exercise pattern is acure for a trouble free menopause. Regular exercise benefits the heart and bones, helps toregulate weight and contributes to a sense of overall well being and improvement in mood(Javoor, 2006)

Changing lifestyle may help women to reduce menopausal symptoms, keep bone density and reduce risk of heart disease. (British Dietetic Association, 2012).During menopause varieties of foods have to be included to get all the nutrients needed. Eating and drinking two to four servings of dairy products and calcium-rich foods a day will help ensure enough calcium in the daily diet. Eating at least three servings of iron-rich foods a day will help to ensure getting enough iron in the daily diet. Saturated fat and Trans fat raises cholesterol and increases the risk for heart disease. So,Saturated fat, trans fat, and cholesterol should be limited and replaced by healthy mono- and poly unsaturated fat in the

diet. At least one and a half cup of fruits and two cups of vegetables should be taken each day. Keeping a healthy weight decreases the risk of heart disease and other problems. Physical activity helps to maintain a healthy weight, keep bones strong and energy levels up, and to decreased risk of heart disease and other age-related complications (www.webmd.com)

National Institute of Ageing (NIA) 2010 recommends eating a diet high in calcium and vitamin D to help maintain strong bones, as well as doing weight bearing exercise. Vaginal lubricants or estrogen creams help to address vaginal dryness. Stress should be reduced in life, and effective coping mechanisms have to be adopted to deal with the emotional issues associated with menopause.

With this background he present study has been planned to throw light in this direction with the following objectives:

To

- study the Socio- Economic background of selected post menopausal women.
- Assess their nutritional status in terms of anthropometric, clinical and biochemical methods.
- find out the food and nutrient intake to assess the adequacy.
- study the occurrence of menopausal problems and non-communicable disease among post menopausal women.

REVIEW OF LITERATURE

II.REVIEW OF LITERATURE

The literature pertaining to the present study entitled **"Nutritional Status and Dietary Pattern of Post- Menopausal Women in Coimbatore"** is presented under the following headings:

A. Factors influencing Menopausal problems

B. Symptoms of Post Menopause

C. Physiological, Biochemical and Psychological Changes during Post Menopausal period

D. Complications and Treatment of Menopause and

E. Other studies

A. FACTORS INFLUENCING MENOPAUSAL PROBLEMS

Rotem*et al.*, (2005) examined the impact of participation in a psycho-educational program on women's attitudes toward menopause, the perceived severity of their symptoms and the association between the two. They concluded that attitudes toward menopause influenced the severity of symptoms, the more negative attitudes, the higher was the severity of symptoms. Significant improvements in attitudes and reductions in symptom severity were seen among the participants compared to their own baseline scores and with the control group.

Muir *et al.,* (2013) found from their studies that an increase in the amount of physical activity performed each day resulted in a positive effect on bone mineral density at the hip, Ward's triangle, trochanter and femoral neck ($B = 0.006$ to 0.008, $p < 0.05$) and also suggested that age had a negative effect on bone density while Body Mass Index had a positive effect.

Moilanen*et al.,*(2012) examined the association of physical activity and change in the quality of life(QoL) during menopause. The results of the eight year follow-up study revealed that physical activity among peri and

post menopausal women increased to about 28 per cent and 27percent more often than among pre-menopausal women which was only 18 per cent. Correlation between the change in quality of life and menopausal status was insignificant. The likelihood of improvement in the quality of life of highly educated women was higher than less educated women. Women whose physical activity either increased or remained stable and women whose weight remained stable improved their quality of life when compared to those who gained weight.

Bhurosy and Jeewon (2013) conducted a survey among working pre and post menopausal women in Mauritis in order to determine the factors which affect BMI and Food habits. Menopause had an association with food habits. The consumption of high fat protein sources, sweetened beverages and fast foods were higher among pre- menopausal women. This result corroborate with the study conducted in Spain by Schoppen*et al.,*(2005). Menopause affects the eating habits and BMI of working women, nevertheless the consumption of refined cereals and full cream dairy products were high. Menopausal women adhered to better eating habits because they aimed that it helped in the reduction of physiological changes occurring in the body. Menopausal women being aware about Osteoporosis risk, consumed higher amounts of full cream products. This was the reason for higher mean BMI among post menopausal women than that of pre menopausal women.

Langstemo*et al.,*(2011) determined the relation between dietary patterns and incident fractures and possible mediation of this relation by BMI, BMD or falls. They suggested that a diet high in vegetables, fruits and whole grains may reduce the risk of Low – trauma fracture, particularly in older women.

According to American Society for Reproductive Medicine (2007) age is one of the factor which influences menopause.

According to Fuhrman (2013) green tea intake may reduce the risk of Breast Cancer among pre menopausalwomen in Luteal phase by modifying Estrogen metabolism.

Gilsing*et al.,* (2011) conducted a prospective study which suggested that among all types of oil and meat,trans unsaturated fatty acid only is associated with increased Ovarian Cancer risk.

Most recently, randomized controlled prevention trials that evaluated hormone therapy for the purpose of reducing or preventing coronary heart disease among women have found that hormone therapy is associated with increased risks for coronary heart disease. The most recent of these trials again identified increased risks for breast cancer associated with estrogen plus progestogen therapy. The evolving evidence base from these trials is complicated and in some cases contradictory. Specifically, the data suggest that the timing of when hormone therapy is initiated once a woman is postmenopausal mayinfluence her risk for developing heart disease and breast cancer (Alexander,2012).

Most of the women in reproductive age group perceived themselves to be healthy to normal. Morbidity relating to sweating, shivering, low grade fever and excess bleeding was mainly reported by older premenopausal women. As compared to older pre and post menopausal women, large number of younger premenopausal women reported acidity, diarrhoea and dysentery. Respiratory infection, cough and cold and constipation were reported by older premenopausal and postmenopausal women. In all categories of diseases, multiple morbidities were not only reported by post menopausal women but also by older pre menopausal women (Geetha, 2010).

Pimenta*et al*., (2013) studied the association of Spirituality with Menopausal symptoms among 710 peri and post menopausal women. This study evidences that the most significant contributor for a severity of

Menopausal symptom is spirituality which was regarded as the positive characteristics in terms of development and reporting of Physical and Psychological symptoms.

B. SYMPTOMS OF MENOPAUSE:

Vasomotor instability (or hot flashes), a primary symptom of menopause, includes a sudden feeling of intense heat accompanied by perspiration and flushing (NIH, 2005) and typically lasts less than 10 minutes. Vasomotor instability may also be associated with symptoms of anxiety, palpitations, and sleep disturbances. Although the prevalence of vasomotor symptoms varies across racial and ethnic backgrounds, more than 50 per cent of women reported vasomotor symptoms at some point during menopause (O'Neill and Eden, 2012).

Declining estrogen levels were associated with urogenital atrophy. Vulvar and vaginal symptoms may include dryness, pruritus, burning, and pain, especially with intercourse. Although the natural aging process is a contributing factor to urogenital symptoms, estrogen deficiency has been established as the main etiology of vaginal epithelial thinning and atrophic vaginitis (Gorodeski, 2012).

The onset of vasomotor symptoms occurred in the perimenopausal state. Hot flashes began as a sudden sensation of heat centered on the face and upper chest which rapidly became generalised. The sensation of heat lasted a few minutes, can be associated with profuse perspiration, and can be followed by chills and shivering. Symptoms resulted from inappropriate peripheral vasodilatation leading to rapid heat loss and a decrease in core body temperature, and shivering then occurs to restore the core temperature to normal (Casper,1985)

The changes to hormone production which occur at menopause, and particularly the rapid decline in **oestrogen production**, cause the skin and muscles cells of the vagina and vulva to deteriorate. During Post-menopause, the vaginal walls become pale, smoother and less elastic due to

degeneration of the connective tissue components of the vagina (e.g. collagen, smooth muscle) which usually give them their elasticity. In addition the vagina typically becomes shorter and narrower as a result of hormonal changes which occur at menopause.Every woman experiences her midlife years differently. The changes that occur during this period, including changes in sexual well-being, are typically caused by a mix of both menopause and aging, as well as by typical midlife stresses and demands (Bernis and Reher, 2007)

Women in the menopausal transition commonly reported a variety of symptoms, including vasomotor symptoms (hot flashes and night sweats), vaginal symptoms, urinary incontinence, osteoporosis, trouble sleeping, sexual dysfunction, depression, anxiety, labile mood, memory loss, cognitive decline, fatigue, headache, joint pains, and weight gain (Borrelli*et al.,*2010).

One hundred and ten post menopausal women expressed and rated sleep difficulties, night sweats, irritability and forgetfulness as the most severe symptoms (Berg, *et al.,*2007). In a study by Im*et al.,*(2013)about 30 per cent of White women experiencedhot flashes and sweating while only 18 per cent to 21 per cent of Asian women experienced them. White and African American women were more likely to report “night sweat” than other ethnic groups, and Asian American women were less likely to experience “hot flash” compared with any other ethnic groups. White and Asian women were more likely to report “muscle and joint stiffness and soreness” than any other ethnic groups.

There was no evidence that adjuvant chemotherapy treatment for early stage Breast Cancer produces significant cognitive decline in post-menopausal women in the areas of most complaints: memory, attention, and information processing. There was evidence, however,that Breast Cancer patients receiving chemotherapy exhibited motor slowing as compared to Breast Cancer patients who did not receive chemotherapy (Tager*et al.,* 2010).

Menopausal experiences of the women with and without DS (Down's syndrome) were very similar. Most of the women were unaware of menopause-associated changes in their body and few understood why they menstruated (Willis*et al.,*2011).

Hafiz *et al*., (2007) examined the experience of menopause in Indian women (aged 45–65 years) in Sydney, and the relationship between socio - demographic factors and menopausal symptoms, and also to explore the cultural context using 29-item Menopause-Specific Quality of Life questionnaire. Results revealed that the mean age of menopause for Indian women was found to be earlier than in other groups,while there were higher scores for physical symptoms than for other symptoms, and there were significant differences between perimenopausal women and the others, it was found that the prevalence of classical menopausal symptoms was lower in Indian women than that found in Caucasians. However, physical and several psychological symptoms were found to be more prevalent than the usual vasomotor symptoms. Unemployed women and women with a tertiary level of education were found to experience a significantly higher score for all symptoms.

C. PHYSIOLOGICAL, BIOCHEMICAL AND PSYCHOLOGICAL CHANGES DURING POST MENOPAUSAL PERIOD:

Riza*et al*.,(2009) examined the effects of various anthropometric determinants on mammographic patterns among 900 post menopausal women accounting for reproductive differences. Mammograms of the 900 post menopausal women were associated with changes in reported and measured height, weight, changes in body figure, hip, chest circumference, BMI, Chest/Hip ratio, Waist Hip ratio, Breast size and leg length. Results revealed that chest circumference which is the measure of upper body fat adiposity appears to be a stronger determinant of mammographic patterns

than body fat distribution and decreased mammographic density is associated with heavy body build in adulthood.

Chang*et al.*, (2013) studied the effects of BMI on menopausal symptoms among 223Asian American women with two different classification systems – the International and the BMI classification for Public Health action. According to the International classification there was no significant differences seen in the prevalence and severity scores among the three subclasses and total menopausal symptoms. When BMI classification was used as an independent variable for Public Health action among Asian population, total menopausal symptoms and severity scores of the three subclasses showed significant differences. Asian American midlife women who were in the BMI classification for high risk had significantly more severe symptoms than those who were in BMI classification for increased risk.

Pollan*et al.,* (2012) investigated the influence of abdominal fat distribution and Adult weight gain and also explored the association of Breast Cancer with visceral adiposity and BMI. Results revealed that WHR was inversely associated with Mammographic Density (MD) with more pronounced results among pre – menopausal women than post – menopausal women. Mammographic Density showed positive association with weight gain and it was similar in both the groups.

Edwards and Li (2013) explained that after menopause there was a threefold increase in Luteinizing hormone and 10 – 20 fold increase in Follicle Stimulating Hormone level reaching maximum level by 1 – 3 years, followed by gradual decline. Post Menopausal ovary secreted more testosterone than pre- menopausal ovary. Estradiol levels after menopause ranged from 10 – 20 pg/ml, and it was less than the Estrol which was 30 – 70 pg/ml. After menopause as the Androgen: Estrogen ratio changes, mild hirsutism occurred reflecting a marked shift in sex hormone ratio. Eventhough there was no Estrogen production after menopause, there was significant levels of Estrogen in Post menopausal women which was due to conversion of Testosterone and Androstenedione to Estrogen. There was a

positive correlation between body weight and circulating levels of Estradiol and Estrone.

Yonker*et al.*, (2013) analyzed the relationship between longevity and Menopause including other factors that impact "Ovarian lifespan" such as Oopherectomy, births, Hormone Replacement among 5034 women. The reproductive – cell cycle theory of ageing posits that reproductive hormone changes associated with Menopause and Andropause drive senescence via altered cell cycle signaling among those whose menopause onset was later, 2.9 per cent reduction in mortality was seen for each year of delayed Menopause (Proceedings of the Nutrition Society of India, 2011).

Cholesterol, Triglycerides and Low Density Lipoprotein (LDL) showed no significant changes among both the Surgical and Natural Menopause group. Post – operative values of Bleeding and Clotting time was found to be increased than Natural Menopause group whereas Fibrinogen level was higher among the Natural Menopause group. Carotid Artery Doppler Examination indicated that Pulsality Index(PI) and Resistive Index(RI) were higher among Post- operative group. Kupperman Index was lower in Natural Menopause group. Vaginal Maturation Index (VMI) showed no significant differences among both the groups (Tuna,2010).

Rinaldi*et al.,(2014)* determined the physical activity, sex steroid and growth factor concentrations in post and pre- menopausal women. Results revealed that active pre- menopausal women showed significant lowered concentration of Androsterone by 19 per cent,lowered Testosterone by 14 per cent, lowered free Testosterone by 20 per cent than the inactive women. In terms of estrogen, progesterone, sex- hormone binding globin and growth hormone showed no differences.

Jackson *et al.,* (2010) evaluated the impact of menopausal status on the Postprandial TAG response among 37 pre-menopausal and 61 Post menopausal women which proved that Fasting Total Cholesterol, LDL - Cholesterol and Glucose were higher among Post Menopausal women. TAG response showed marked differences in postprandial samples rather

than in fasting group with maximum concentration in the Post Menopausal women with greater incremental area under the curve (IAUC).

Liu, *et al.,* (2011) assessed the plasma samples from 244 post-menopausal women of Xi'an urban area for testosterone, estradiol, calcitonin, osteocalcin and N-terminal propeptide of type I procollagen by ELISA and concluded that the blood sex hormone and calcitonin levels were decreased in post-menopausal women with osteoporosis and a significant increase in osteocalcin levels and these indicators are significantly correlated with the BMD of the lumbar spine and hip. These findings provided evidence for understanding of risk factors of osteoporosis and laid the foundation for further study of osteoporosis pathogenesis of post-menopausal women and its interventions.

Ameratunga*et al.,* (2012) reported that the most important complaint faced by post menopausal women was Sleep disturbance, due to the factors like vasomotor symptoms, hormonal changes, exacerbation of primary insomnia, circadian rhythm abnormalities, mood disorders, coexistent medical conditions and lifestyle factors.

Polysomnographic analysis on 38 Post Menopausal women proved that Sleep efficiency was increased by reducing the Insomnia symptoms among those who were under Isoflavone treatment (Hachul*et al.,* 2011).

Darling *et al.,* (2011) investigated whether there was any association between Vitamin D status and sleep duration among 375 South Asian and Caucasian Peri and Post Menopausal women by assessing the Vitamin D status (Serum 25 (OH)D) and relevant anthropometric information from D-FINES (Vitamin D, Food Intake, Nutrition and Exposure to Sunlight). They concluded that there was no association between Vitamin D status and Sleep quality in neither of the Ethnic groups.

Research suggests that depression by women who are transitioning menopause should not necessarily be attributed to menopause (Avis, 2003). Erez*et al.*, (2012) examined the relationship of anxiety, depression and stress with Bone mineral density (BMD) among 135 post menopausal

women. The study showed negative association between depression and BMD.

Brombergeret *al.,* (2011) concluded that during menopause and immediately after menopause, depression was greater than during Pre – menopausal period. Lisa Herzig (2012) found that a women's voice was affected during Menopause by physical, emotional, psychological life changes.

Singh (2006) compared the mental health status of middle aged(45- 55 years) working menopausal women and Post menopausal women. Results revealed low to moderate level of depression, anxiety, somatic symptoms, social dysfunctionand psychosocial stress among working women and comparatively higher in post menopausal group rather than menopausal group.

Most women in Turkey had negative attitudes towards menopause. Majority of women with positive attitudes were older, well educated and had used hormone replacement therapy ($P < 0.05$). A statistically significant difference was found between the women in the premenopausal and menopausal years in terms of sexuality after menopause ($P < 0.05$). Turkish women of 40 years and older had negative attitudes towards menopause and their primary concern in the premenopausal period was sexuality after menopause. Kisa*et al*(2012) recommended that women should be given counseling on menopause-related issues in gynecology clinics.

Midlife decline in cognition, specifically in areas of executive functioning, is a frequent concern for which menopausal women seek clinical intervention. The dependence of executive processes on prefrontal cortex function suggests estrogen effects on this region of brain may be key in identifying the sources of this decline (Shanmuganand Neill Epperson,2014).

D. COMPLICATIONS AND TREATMENT OF POST MENOPAUSAL PROBLEMS:

Women in menopausal transition experience a variety of menopausal symptoms. Although hormonal therapy remains the most effective treatment, side effects have been reported by several large studies. An increased number of women seek the use of complementary and alternative medicine (CAM) for treating menopausal symptoms. Evidence from systematic reviews, randomized controlled trials and epidemiological studies of using herbal medicine (Black cohosh, Dong quai, St John's wart, Hops, Wild yam, Ginseng, and evening primrose oil) and acupuncture for the treatment of menopausal symptoms have been reviewed. Evidence supporting the efficacy and safety of most CAM for relief of menopausal symptoms are limited. Future larger and better controlled studies testing the effectiveness of these treatments are needed (Shou, *et al.,* 2011).

Women who preferentially consumed wine had a lower risk of hip fracture compared to non-drinkers, past drinkers, and those with other alcohol preferences. (Kubo *et al.*,2013).

The current evidence does not suggest an important effect of tibolone or of SERMs (Selective Estrogen Receptor Modulators) alone or combined with estrogens on sexual function. More studies evaluating the effect of synthetic steroids, SERMS and the association of SERM + estrogens would improve the quality of the evidence for the effect of these treatments on sexual function in peri and postmenopausal women. Future studies should also evaluate the effect of HT solely among women with sexual complaints (Nastri, 2013).

Hormone Therapy is not indicated for primary or secondary prevention of cardiovascular disease or dementia, nor for preventing deterioration of cognitive function in postmenopausal women. Although HT is considered effective for the prevention of postmenopausal osteoporosis, it is generally recommended as an option only for women at significant risk, for whom non-oestrogen therapies are unsuitable. There are insufficient data to assess the

risk of long term HT use in perimenopausal women or postmenopausal women younger than 50 years of age (Marjoribanks, 2012).

A study byRuszkowska*et al.,* (2012)showed that women who used transdermal MHT (Menopausal Hormonal Therapy) had higher levels of total ghrelin than women who took oral MHT. This indicated a beneficial effect of the transdermal route of MHT. However, transdermal therapy was associated with adverse effects with regard to the observed higher levels of PAI-1:Ag, which in turn, can lead to a reduction in fibrinolytic activity.

The incidence of Osteoporosis was reported to be 24 per cent in lumbar spine, 4 per cent in femoral neck, 11 per cent in wards triangle and 16 per cent in forearm. Significant correlation was found only with the type of and duration of menopause. The relative risk (RR) of getting Osteopenia or Osteoporosis was high in the parameters like age (51 – 60 years), duration of menopause ($\leq$ 5 years), intake of calcium supplement and exercise. It was highly recommended to reduce the degree of severity at later age screening followed by diagnosis of osteoporosis around the age of 50 years in women should be carried out followed by nutrition, life style and medical interventions (Sundaravalli, 2011).

The Menopausal symptoms affect many women and are said to be distressing in 10-20 per cent. Management should include consideration of diet, lifestyle, past and family history and current medication. HRT is currently the most effective treatment available for control of symptoms, and when used appropriately with individualization of treatment, use of the lowest effective dose and regular review, the benefits are likely to outweigh the risks. Other therapies have been shown to be effective and can be considered, but are not without risks and side-effects. Provision of accurate information is essential to enable women to make informed choices and take an active part in the management of their menopause (Currie and Cochrane, 2010).

Estrogen Replacement Therapy is not associated with improvements in mood or anxiety symptoms in non-depressive, hysterectomized,

postmenopausal women (Demetrio*et al.,* 2011).In post menopausal women with Insomnia, Isoflavone treatment was effective in reducing insomnia symptoms, which was confirmed by increased sleep efficiency as observed by Polysomnographic analysis (Hachul, *et al.,*2011).

Xie*et al.,* (2013) conducted a meta analysis on the association of Isoflavone intake and Breast Cancer risk from 22 studies and concluded that among the Asian populations, that too especially among post menopausal women exposure to high isoflavone is associated with a reduced risk of Breast Cancer, however there was no significant difference seen in the studies of Western population.

Hot flashes are prevalent and severe symptoms that can interfere with mood, sleep, and quality of life for women and men with cancer. Results indicated that risk factors for hot flashes in cancer include patient-related factors (eg, age, race/ethnicity, educational level, smoking history, cardiovascular risk including body mass index, and genetics) and disease related factors (eg, cancer diagnosis and dose/type of treatment). In addition, although the pathophysiology of hot flashes has remained elusive, these symptoms are likely attributable to disruptions in thermoregulation and neurochemicals (Fisher, *et al.,* 2013).Therapies that have been offered or tested for hot flashes fall into 4 broad categories: pharmacological, nutraceutical, surgical, and complementary/behavioral strategies. The evidence base for this broad range of therapies varies, with some treatments not yet having been fully tested or showing equivocal results.

While hormone replacement therapy is very effective in the treatment of most postmenopausal symptoms, it is associated with health risks. Given these potential adverse health risks, many nonpharmacological agents have emerged as options in the treatment of postmenopausal symptoms. As many as 50–75 per cent of postmenopausal women use nonpharmacological options to treat vasomotor symptoms, which the majority of postmenopausal women experience, and therefore, it is important for healthcare providers to be aware of and informed about the nonpharmacological therapies available for women who are experiencing postmenopausal symptoms (Tong, 2013).

When acupuncture was compared with no treatment for hot flashes there appeared to be a benefit from acupuncture, but acupuncture appeared to be less effective than Hormone Therapy (Dodin*et al.,* 2013).Anti-resorptive therapy provided a protective effect against loss of bone density (Muir *et al*., 2013)

E. OTHER STUDIES:

Cheung *et al.,*(2011)supplemented fermented Calcium fortified soymilk and Calcium fortified soymilk (CFSM) for 12 Australian Osteopenicpost menopausal women(50-68 years) who were overweight and analysed their blood samples.200 ml of distilled water was taken soon after Calcium fortified soymilk intake. Calcium absorption mean fractional value for fermented Calcium fortified soymilk was 0.29 SD and for Calcium fortified soymilk was 0.23 SD. Fermented Calcium fortified soymilk had 10 percent higher mean fractional Calcium absorption higher values than Calcium fortified soymilk.

Nemati andBaghi (2008) assessed the nutritional status of post menopausal women of Ardebil, Iran. Urban women had greater BMI, Weight and Height than rural women. Anthropometric factors were more for the married women than those who were single. Prevalence of overweight and obesity was greater in both the areas. Post menopausal women were not educated in both areas, but in rural areas the proportion was higher. The mean intake of calorie, protein, fiber, carbohydrate, saturated fat, total fat, folic acid, calcium, vitamin B_1 and C in rural women were more than urban($p<0.05$). The mean intake of Vitamin C,B_1,B_2, and daily iron of post menopausal women were adequate, whereas Calcium, Folate, Zinc, Vitamin B_2, B_6,Selenium and Calorie, were less than the Dietary Reference Intakes(DRIs) in two areas. Bread was the main food source; weekly intake of rice, vegetables and red meat were less among urban women($p<0.05$),but the intake of Pulses/week were more among rural women (p,0.005).

The mean intake of pre and post menopausal women studied was adequate for most of the nutrients with higher percentage adequacy for energy, protein and Calcium. There seemed to be a great awareness for milk consumption among the post menopausal subjects. Comparison of subjects according to the Nutrient Adequacy Ratio (NAR) showed that 32 per cent of the subjects (especially younger and older pre menopausal women) had an energy intake higher than the RDA. In the case of protein also proportionately much higher number of younger pre menopausal women (86. 6%) had a high protein intake (NAR $\geq$1). Regarding fat intake, 34 per cent of the subjects had fat intakes providing more than 30 per cent of daily energy intake. Further a relatively higher number of the Post menopausal subjects (46 %) had a high fat intake, which is likely to create predisposition to cardiovascular problems in a state of Menopause. The Calcium intake of all the subjects was equal to or above the RDA (Geeta, 2010)

Javoor*et al.,*(2007) assessed the nutritional status of 100 Menopausal women aged 40 – 55 years in Dharwad city. Results revealed majority of peri-menopausal women (70 %) and all the pre-menopausal women were in the risk category of Total Cholesterol (80 %) and 20 per cent were in the desirable level. In terms of Triglyceride levels, all the Pre- menopausal and Majority (80%) of Post Menopausal women and 90 % of Peri – Menopausal women belonged to the risk category of 150 - 250 mg / dl. In terms of LDL Cholesterol, women in all the category belonged to the risk category of >100 mg /dl. In terms of HDL- Cholesterol, the risk category of < 45 mg / dl was determined in all the Peri Menopausal, majority of Post Menopausal(86.7%) and 80 per cent of Pre menopausal women. Hormonal imbalance in the body of Menopausal women lead to elevated levels of LDL and Total Cholesterol and reduced levels of HDL, due to reduction in circulating Estrone and Estradiol level.

Hejazi*et al.,*(2009) assessed the nutritional status of Osteoporotic women among 97 post menopausal women in North West of Iran. The results revealed that most of the postmenopausal osteoporotic women had a

considerable deficiency in terms of energy and some micronutrients such as vitamin D, calcium, and magnesium, which can be deleterious for bone health.

The Pharmacoepidemiological study of osteoporosis and itstreatment in primary and secondary care in France confirmed that compliance to anti - osteoporosis treatments as considered by the patient was poor, but identified reduction of the dosing regimen frequency and patient education measures were potentially useful ways of improving compliance(Huas*et al .,* 2010).

Interventions to reduce the incidence of fractures, particularly hip fractures resulted in significant cost savings to the health care system and preserved quality of life in many patients(Bessette*et al.,*2012).

GreGorio*et al.,* (2014) analysed the relationship of dietary protein on body composition and physical performance among 387 healthy women aged 60 – 90 years. Results revealed that healthy, older postmenopausal women consumed, on an average, 1.1 g/kg/d protein, although 25% consumed less than the RDA. Those in the low protein group had higher body fat and fat-to-lean ratio than those who consumed the higher protein diet. Upper and lower extremity function was impaired in those who consumed a low protein diet compared to those with a higher protein intake. Protein intake should be considered when evaluating the multi-factorial loss of physical function in older women.

Choia (2012) investigated whether treatment with sunflower (*Helianthus annuus L*) seed extract (SSE) may affect the function of MC3T3-E1 osteogenic cells. Treatment with SSE (10 and 50 mg/ml) decreased the 5 mg/ml lipopolysaccharide-induced production of TNF-a, IL-6 and Nitric Oxide in osteoblasts. The data indicated that the enhancement of osteoblast function by sunflower seed may result in the prevention for osteoporosis and inflammatory bone diseases.

Mackey et al. (2013) explored knowledge, attitudes, and practices among Fifty-eight Chinese, Malay, and Indian Singaporean women about the factors associated with the menopause transition particular to women in the multi-ethnic cultural context of Singapore. Women from all three ethnicities described an attitude of acceptance surrounding menopause and the changes associated with it. While they thought it was important to be informed, they did not seek out information about menopause and did not view health professionals as useful sources of information. Management practices were diverse and rarely involved accessing health professionals.

Shin (2012) evaluated and compared the psychometric properties of the MQOL (Menopausal Quality of Life) and the WHQ (Women's Health Questionnaire) among 304 Korean women in menopausal transition. The results indicated that both QoL instruments were valid, but the WHQ was more internally consistent for measuring QoL with the new factor structure identified. However, all research, including the current study, had suggested different factor structures for both the MQOL and the WHQ. Thus, further studies to identify factor structures are needed for both measures.

McCarthy (2002) explored the perceptions, experiences and support needs of women with intellectual disability as they go through the menopause. Findings presents that 15 women aged 43–65 years were with mild to moderate intellectual disability. Levels of knowledge about what the menopause was, when it happened, and whether it happened to all women, were found to be generally low. More significantly, the majority of the women did not understand the significance of the menopause on a woman's reproductive capacity. The findings suggested that the impact of themenopause on women with an intellectual disability is likely to be predominantly physical,with relatively little psychological or social role adjustment necessary.

Ages at menopause were significantly earlier among Bangladeshi sedentees and immigrants compared to Londoners of European origin. Urban birthplace, more infectious diseases during childhood, and lower levels of education increased the risk of an earlier menopause. Changes in environmental conditions during adulthood appeared to modify age at menopause among Bangladeshi immigrants in London compared to women living in Bangladesh (Murphy *et al.,* 2013).

Erbil*et al.,*(2012) investigated women's menarche and menstrual experiences and their effects on attitudes towards menopause among 300 women using the Menopause Attitude Scale and a questionnaire. Significant differences were found between attitudes of women towards menopause and the information they had received before menarche about menstruation (P = 0.024), the meaning of menstruation (P = 0.014), the interval time between menstrual periods (P = 0.017), problems experienced before menstruation (P = 0.035) and the desire of some women to continue menstruating and delay menopause (P = 0.005). Results showed that more than half of the women had negative attitudes towards menopause. In order to help girls and women develop positive attitudes about menarche, menstruation and menopause, they need to have access to information during all phases of these important physical changes.

Labial fusion is a rare clinical entity in post-menopausal women and can have serious andunexpected complications. Though this presentation is rare, a clinical examination must be performed in detail in order to gain valuable information for an accurate diagnosis. Post-operational instruction must be given to patients in order to prevent the re-occurrence of the fusion and its complications (Tsianos, 2011).

Im*et al.,* (2010) described the experience of menopausal symptoms of midlife Black women in the United States. The women tried to be strong during their menopausal transitions while dealingwith other important family matters. They did not report their menopausal symptoms and were silent about ordownplayed their symptoms, but many emphasized the importance of education about menopausal symptoms andhighlighted their own lack of knowledge.

Gita *et al*., (2010) investigated the effect of menopausal transition and age on symptoms of urinary incontinence in midlife. The study disentangled the effects of age, menopausal transitions, and other life-long risk factors on UI (Urinary incontinence).Results concluded that menopausal transition was only related to stress UI, while increasing age was related to both stress and urge UI and suggested that there are both shared and distinct etiological pathways leading to each type of UI.A randomized controlled study showedthat estrogen replacement improved subjective sleep qualityregardless of periodic limb movements or related arousals.However, movement intensity, duration, and intervals didnot change with estrogen therapy (Polo-Kantola,2001).

METHODOLOGY

III.METHODOLOGY

Designing a suitable methodology is very important for the meaningful study of any problem. The methodology pertaining to the present study entitled "**Nutritional Status and Dietary pattern of Post Menopausal Women in Coimbatore**" is presented under the following headings.

A. Selection of the Area
B. Selection of the Sample
C. Formulation of Tool for Data Collection
D. Conduct of the Survey
E. Assessment of Nutritional Status and
F. Analysis of the Data.

A.SELECTION OF THE AREA:

The investigator selected Coimbatore,which is known as the "Manchester of South India" for the survey as the investigator resides in that area for many years. The Urban/Metropolitan population of Coimbatore is 2,151,466 of which 1.077,812 are Male and 1,073,654 are Female(http://payment.ccmc.gov.in/Attachments/WSRFPDocument1.pdf).Availability of more number of women is another reason for selecting Coimbatore for the study.In Coimbatore three sub urban areas namely Machampalayam,Kurumbapalayam and Sundarapuram were selected for the survey because of easy approachability and familiarity of the places to the investigator.

B.SELECTION OF THE SAMPLE:

According to Goode and Hatt(2009), a sample is a smaller representation of a larger whole.

Samplingis the process or method of drawing a definite number of individuals, cases or observation from a particular universe; selecting part of a total group for investigation; survey procedures having to do with the selection of the sample, collection of information from sample case and statistical treatment of findings so as to yield a representative group (Fairchild, 2009).

The investigator visited individual houses to get to know the presence of post menopausal women. Nearly 120 women in the age group of 40 years and above in the post menopausal period were selected for the survey by Purposive Sampling. The objectives of the study were clearly explained to the women prior to the survey. Details were collected from those who were willing to participate in the study.

Purposive Sampling denotes the method of selecting a number of groups or units in such a way that the selected group together yield as nearly as possible the same average or proportions as the totality with respect to those characteristics which are already a matter of statistical knowledge (Jenson, 2009). In the present study, post menopausal women were the target group and hence purposively they were selected and included for the research.

C.FORMULATION OF TOOL FOR DATA COLLECTION:

For collecting data, Interview Schedule is a very useful method in extensive enquires and can lead to fairly reliable results (Kothari, 2002).

Personal interview in the views of Young (2009) is an effective,informal verbal and non-verbal conversation,initiated for specific purpose and focused on certain planned content areas.

Bearing the objectives in mind, the investigator formulated a detailed Interview schedule in order to elicit information regarding socio – economic status, dietary pattern, health status and related information about the post menopausal women. The Interview schedule was pretested on 10 post menopausal women and necessary modifications were made and then used for further survey (Appendix I)

D. Conduct of the Survey:

With the evolved Interview Schedule,information regarding the socio- economic status such as age,marital status,educational qualification,type of work,source of income,type and size of family were obtained from the post menopausal women during the times specified by them as convenient.

A good rapport was developed with the women before conducting the interview (Plate 1).

Information regarding physical activity pattern such as type and duration of physical activity(exercise/yoga) were also obtained.

Health is the state of complete, physical,mental and social well being and not merely the absence of disease and infirmity (WHO, 2010). Details regarding the Reproductive cycles such as age at first conception,interval between each conception,nature of delivery, complications during pregnancy,age at menopause, symptoms,medications and surgery underwent during and after menopause and diseases experienced by the womenwerealso collected.

A Menopause Assessment Scale was used to assess the severity of menopause (Appendix II).

E. ASSESSMENT OF NUTRITIONAL STATUS:

Nutritional Status is the condition of health of the individual as influenced by the utilization of nutrients(Monika.*et.al*,2011). The following methods were used for assessing the Nutritional Status of the selected post menopausal women.

(a) Anthropometric Measurements:

Anthropometrics are objective measurements that help determine the amount of muscle and percentage of body fat.It involves obtaining physical measurements of an individual and relating them to standards that reflect the growth and development of an individual.The physical measurements are another component of the nutritional assessment and are useful for evaluation of over nutrition or under

nutrition (Krause,2002).It is based on the concept that an appropriate measurement should reflect any morphological variation occurring due to significant functional physiological change (Bamji,2006).

(i)Height:

According to Jelliffe (1990), the height of an individual is principally a measure of skeletal body tissue, leg, pelvis, spine and skull.Lynn, *et al*., (2009)reports that with ageing,skeletal muscle decrease in bulk and power and ligaments lose some of their tensile strength.

For taking the height of the post menopausal women,they were made to stand against the wall without any footwear and with their foot touching the walls.A horizontal scale was placed gently to touch the head and markings done on the wall.The height was measured using a non-stretchable tape to the nearest 0.1 cm .The same procedure was followed for all the women and their height was recorded (Plate 2).

(ii)Body Weight:

Body Weight is the most widely used and the simplest reproducible anthropometric measurement for the overall evaluation of nutritional status. It indicates the body mass and is a composite of all body constituents like water, fat,protein, bone. etc.,(Bamji, 2006).It is used to assess the growth,predict protein needs and determine body composition (Paul, 2004).

Weight provides an index of calorie intake and changes overtime, yield other valuable diagnostic data.Changes in weight can occur with changes in body fluid status,as well as in fat or muscle mass (Lynn *et al*., 2009).Any assessment of body weight can be misleading if the patient is retaining fluid or dehydrated, weight loss is best expressed in terms of per centage weight gain.

Weight was measured for all the women using a weighing balance(Bathroom scale) which was calibrated properly. They were made to stand erect in bare foot with minimal clothing on the centre of the platform and the weights were taken to the nearest 0.1 kg and recorded (Plate 3).

(iii) Body Mass Index (BMI):

BMI is a simple indicator of total body fat or Obesity (Carolyn,1996).BMI is accepted as a better estimate of body fatness and health risk than body weight. It is also called as Quetlet Index (Sri Lakshmi, 2011).BMI is expressed as a ratio of weight in kilogram to square of height in meter.

$$\text{BMI} = \frac{\text{Weight in Kg}}{\text{Height in m}^2}$$

Accordingly BMI was computed using the height and weight data for all the women and categorized based on WHO (2009) classification.

BMI CLASSES	PERSPECTIVE DIAGNOSIS
Below- 18.5	Underweight
18.5-22.9	Normal
23- 24.9	Overweight
Above 25	Obese

BMI classification for Asian Adult (WHO,2009)

(iv) Waist Circumference:

Waist circumference measurements assess abdominal fat content (Center for Disease Control and Prevention, 2002). A waist circumference greater than 35 inches (88 cm) in female and greater than 40 inches (102 cm) in male is associated with higher Cardio metabolic risk (Ness-Abramoff and Apovian, 2008).

Waist circumference was measured at the narrowest part of the waist by measuring the distance around the smallest area below the rib

cage and above the umbilicus(belly button) with the use of a non – stretchable tape measure to the nearest 0.1 cm (Plate 4).

(v) Hip Circumference:

Hip circumference is the measurement of the maximum circumference of the hip. It is taken at the widest area of the hip at the greater protuberance of the buttocks. Hip Circumference was measured for all the women using the tape passing over maximum protuberance on buttocks. (Plate 5)

(vi)Waist to Hip Ratio (WHR):

WHR assesses body fat distribution as an indicator of health risk (Folsom,
*et al.,*2001).The ratio of Waist to Hip is an indicator of central obesity. Adult men with Waist to Hip ratio of ≥0.95 and women with ≥ 0.80 are considered as having Central Obesity (Bamji,2006).Obese person with a greater proportion of fat in the upper body,especially in the abdomen, have android obesity and obese persons with most of their fat in the hips and thighs have gynoidobesity.

$$\text{WHR} = \frac{\text{Waist circumference (cm)}}{\text{Hip circumference (cm)}}$$

WHR was calculated for all the selected postmenopausal women and categorized to find out central obesity.

(b)Recording food and nutrient intake:

The dietary data component of the nutritional assessment involves documenting an individual's dietary intake.Information regarding the food intake of the post menopausal women was recorded by 24 Hour recall method which is the simplest and easiest one to obtain data.

The 24Hour recall method of data collection requires individuals to remember the specific foods and amounts of foods they consumed

in the past 24 hours (Krause,2002).The selected women were asked to recall their food intake over a 3 days period using standard cups and measures. The quantities of food consumed were converted into their raw equivalents and nutrients were calculated using ICMR Food Composition Tables.The average nutrient intake per day per individual was calculated.The intake was compared with the RDA suggested by ICMR(2010) for nutrients.

A food frequency questionnaire collects data on how often the individual consumed specific foods or groups of foods,rather than which specific foods the subject consumed daily.This information is used to find out a person's daily choices (Paul, 2004).

Hence a 24 hour recall and food frequency questionnaire was included as a part of the Interview Schedule which helped in recording the food and nutrient intake.

PLATE 1

CONDUCT OF THE SURVEY

PLATE 2

MEASUREMENT OF HEIGHT

PLATE 3

MEASUREMENT OF WEIGHT

PLATE 4

MEASUEMENT OF WAIST CIRCUMFERENCE

PLATE 5

MEASUREMENT OF HIP CIRCUMFERENCE

PLATE 6

CLINICAL EXAMINATION

PLATE 7

DRAWING BLOOD FOR HAEMOGLOBIN ANALYSIS

PLATE 8

HAEMOGLOBIN ESTIMATION

(c)Clinical Examination:

All the selected post menopausal women were screened for visible clinical signs and symptoms related to skin, hair, face, nails, teeth, gums, eyes, nervous system, respiratory system, digestive system and about extremities by the investigator. She has got adequate training in clinical examination at community level programme (Plate 6). The observations were entered in the same Interview schedule

(d)Biochemical Analysis:

Biochemical assessment provides the most objective and quantitative data on the nutritional status of an individual (Subhadra, 2010). It is important to maintain adequate calcium and iron according to Recommended Dietary Allowance in post menopausal period as the absorption of these minerals decrease due to ageing. To avoid resorption of calcium from bone and decreasing of haemoglobin levels in the body it is important to meet the recommended allowance.

The need to assess haemoglobin in post menopausal women becomes important to study the prevalence of anaemia among them. A sub sample of 20 per cent out of the total sample was selected and their Haemoglobin level was measured using Cyanmethaemoglobinmethod (Plate 7).

Ethical clearance:

The research design of the study was presented (Figure 1) to a panel of members present in Avinashilingam University InstiutionalHumanEthics Committee and the research proposal received an ethical clearance with the approval number AUW/IHEC -13 -14/XPD- 01.

The International Nutritional Anaemia Consultation Group and International Committee for Standardisation in Hematology have recommended Cyanmethaemoglobin method (Cook, 1985) for anaemia prevalence studies in India and National Institute of Nutrition,

Hyderabad, has adopted this method for Haemoglobin estimation (NIN, 1990).

(F)Analysis of Data:

The analysis of data is a mathematical process by which the collected data are systematically arranged (Lal, 2009).In the present study, the collected data was edited, tabulated, analyzed and interpreted with appropriate statistical tools.

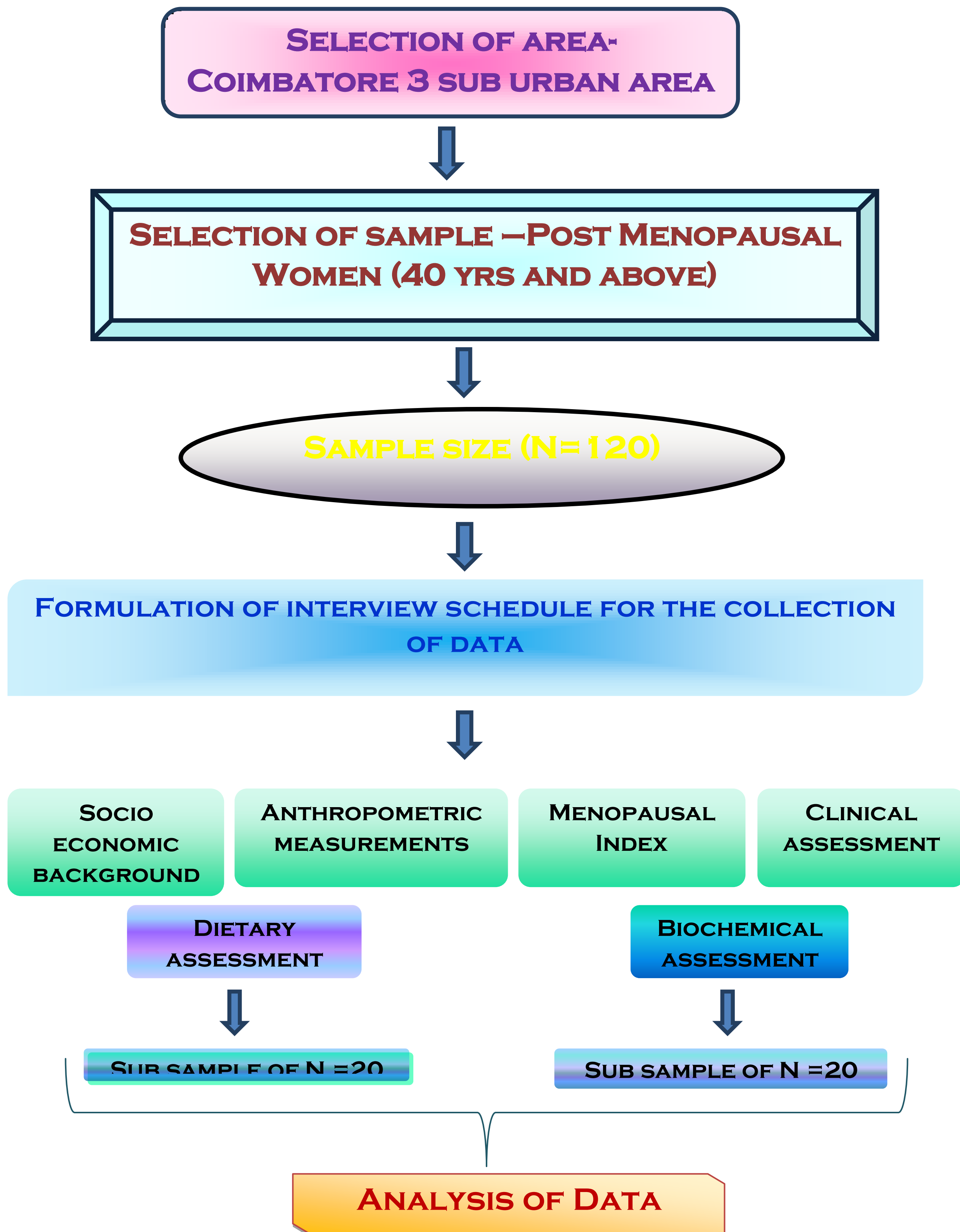

FIGURE 1 – RESEARCH DESIGN

I

RESULTS AND DISCUSSION

IV. RESULTS AND DISCUSSION

The results of the present study entitled "**Nutritional Status and Dietary pattern of Post Menopausal Women in Coimbatore**"are presented and discussed under the following headings:

A. Socio Economic Background of Post Menopausal Women
B. Physical Activity Pattern of Post Menopausal Women
C. Nutritional Status of Post Menopausal Women
D. Dietary Pattern of Post Menopausal Women and
E. Gynecological details and Health Status of Post Menopausal women

A.SOCIO ECONOMIC BACKGROUND OF POST MENOPAUSAL WOMEN

The details collected on the socioeconomic background of families of the selected post menopausal women are discussed in the following side headings.

1. Age and Marital status of the surveyed women

Table I and Figure 2 depict the age distribution and marital status of the selected women

TABLE I

DISTRIBUTION OF WOMEN ACCORDING TO AGE AND MARITAL STATUS

S.No.	Age (in years)	Number	Per cent
1	41 - 50	22	18.3
2	51 - 60	46	38.3
3	61 - 70	32	26.7
4	71 – 80	20	16.7
	Total	**120**	**100**
	Marital status	**Number**	**Per cent**
1	Married	50	41.7
2	Widow	42	35.0
3	Divorcee	28	23.3
	Total	**120**	**100**

From the table it is evident that majority of the surveyed post menopausal women that is 38.3 per cent belonged to the age group of 51 – 60 years anda least percentage of women 16.7 belonged to the age group of 71 – 80 years. Among them 18.3 per cent were in the age group of 41 – 50 years and 26.7 per cent belonged to the age group of 61 – 70 years.

Considering the marital status, 41.7 per cent of the post menopausal women were married, 35 per cent of the women were widows and the remaining 23.3 per cent were living alone as they were divorced.

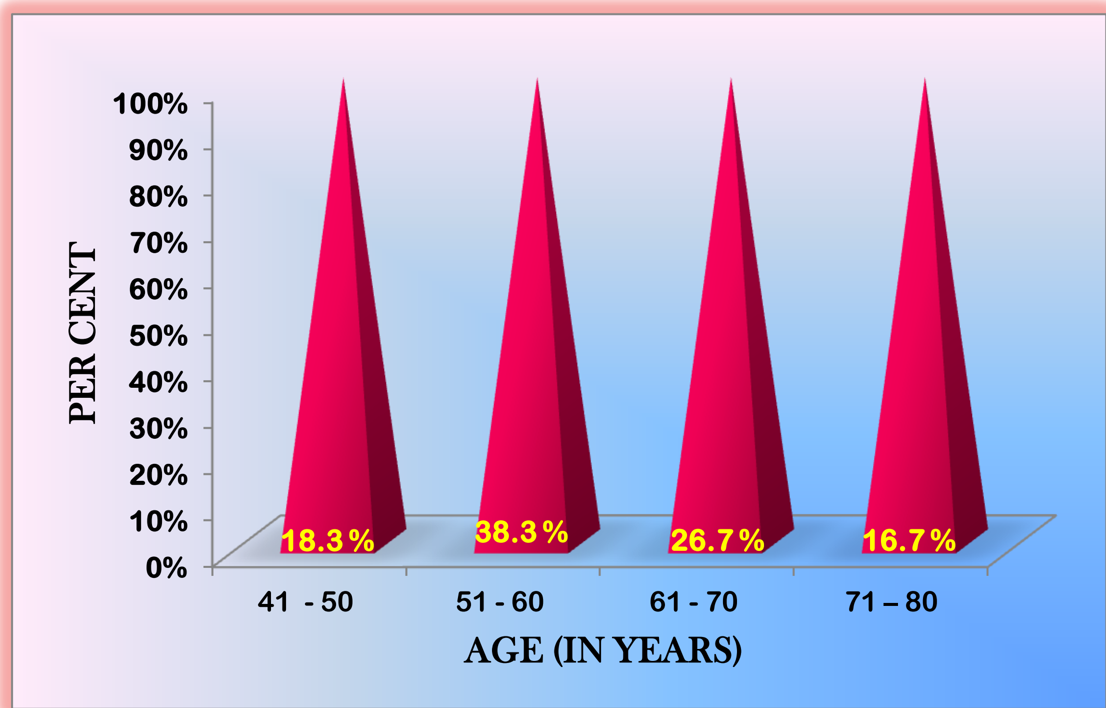

Figure 2

DISTRIBUTION OF WOMEN ACCORDING TO AGE

2. Educational Status of the post menopausal women

The educational status of thepost menopausal women is given in Table II.

TABLE II

EDUCATIONAL STATUS OF THE POST MENOPAUSALWOMEN

S.No.	Educational Status	Number	Percent
1	Primary School	2	1.7
2	Middle School	7	5.8
3	High School	9	7.5
4	Higher Secondary	15	12.5
5	Undergraduate	30	25
6	Post graduate	-	-
7	Professional	3	2.5
8	No education	54	45.0
	Total	**120**	**100**

From the table it is seen that majority of the post menopausal women that is 45 per cent did not have any education whereas a least per centage of 2.5 had studied upto professional courses followed by undergraduate education by 25 per cent of women. Others had done some form of school education. Majority of the women of the present study were uneducated.

3. Occupational Status and Type of Activity of the selected women.

The occupational status and type of activity of the post menopausal women is shownin Table III

TABLE III

OCCUPATIONAL STATUSAND TYPE OF ACTIVITY OF THE POST MENOPAUSALWOMEN

S.No.	Details	Number	Percent
1	Working women	31	25.8
2	Homemakers	89	74.2
	Total	**120**	**100**
1	Business	2	6.5
2	Agriculture	5	16.1
3	Coolie	21	67.7
4	Professional	3	9.7
	Total	**31**	**100**

	Type of Activity	Number	Per cent
1	Sedentary	3	2.5
2	Moderate	91	75.8
3	Heavy	26	21.7
	Total	**120**	**100**

From the table it is evident that 74.2 per cent being the majority of the post menopausal women were home makers as they were aged and not in a position to take up jobs and the remaining 25.8 per cent were working in various government or private sectors or engaged in business. Among the 31 working women, majority that is 67.7 per cent were coolie workers and 6.5 per cent owned a business, 16 per cent were doing agriculture and only 9.7 per cent were professionals.The type of activity of the post menopausal women was categorized according to the classification of activities based on occupations (Nutritive value of Indian Foods by Gopalan*et al.,* 2010). Among them 2.5 per cent belonged to sedentary type of activity, 75.8 per cent were of moderate category and the remaining 21.7 per cent belonged to the heavy working category.

4. Monthly Income of the post menopausal women

Table IV shows the monthly income of the post menopausal women who were working in private or government concerns.

TABLE IV

MONTHLY INCOME OF THE WORKING POST MENOPAUSALWOMEN

Monthly Income* (Rs)	Number	Percent
<3000	21	67.7
3000 – 7000	5	16.1
7000 – 10,000	2	6.5
>10,000	3	9.7
Total	**31**	**100**

***HUDCO classification (2010)**

It is revealed from the table that a low per cent (9.7) of working women were earning more than Rs.10,000. Among the remaining, 6.5 per cent earned Rs. 7000 – 10,000 followed by 16.1 per cent earning Rs. 3500 – 7000 per cent. Maximum per cent that is 67.7 per cent of women earned less than Rs.3000 per month, since they were working as coolies.

5. Totalmonthly income of families of the selected post menopausal women

Total monthly income of the families of the selected post menopausal woman is presented in Table V figure 3.

Table V

TOTAL MONTHLY INCOME OF THE FAMILIES

S.No.	Total monthly family Income * (Rs)	Number	Percent
1	<3000	5	4.1
2	3000 – 7000	68	56.7
3	7000 – 10,000	35	29.2
4	10,000	12	10.0
	Total	**120**	**100**

***HUDCO classification (2010)**

From the table showing the total family income, a maximum of 56.7 per cent families had a low income in the range of Rs 3000 – 7000, followed by 29.2 per cent of families with Rs 7000 to 10,000 per month. Only 10 per cent of families had more than Rs. 10,000 as monthly income whereas 4 per cent of families had less than Rs. 3000 being the lowest monthly income for a family. In general, most of the families of the post menopausal women were in the low to moderate income category.

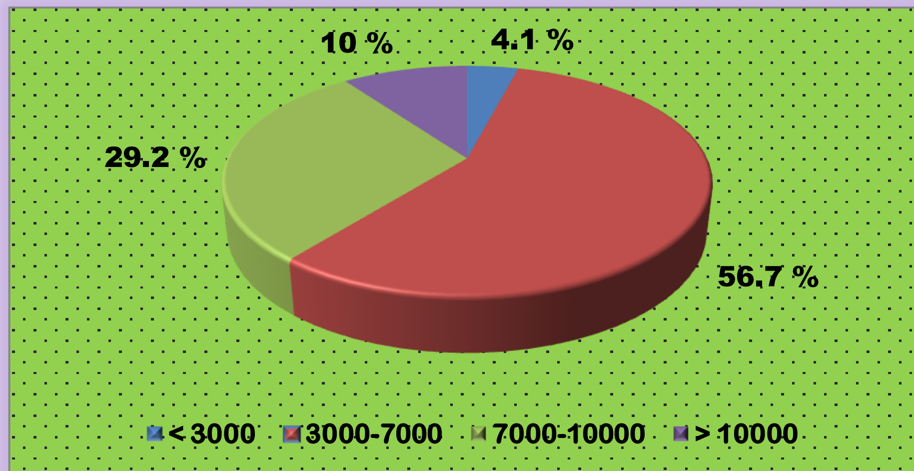

Figure 3

TOTAL MONTHLY INCOME OF THE FAMILY

6. Source of Income

Table VI gives details about the source of income of the surveyed post menopausal women.

TABLE VI

SOURCE OF INCOME OF POST MENOPAUSAL WOMEN

S.No	Source of Income	Number	Per cent
1	Salary	31	25.9
2	Pension	10	8.3
3	Family resources	69	57.5
4	Investments	10	8.3
	Total	**120**	**100**

A maximum per cent of women that is 57.5 per cent who were unable to work due to reasons such as ageing, illness, etc., relied on the family resources(properties) for their livelihood. Nearly 25.9 per cent of women were earning on their own, since they were employed, while 8.3 per cent each received their income through pension schemes or through Investments such as bank interests, etc.,

7. Type and Size of Families

Table VII presents the type and size of families of the post menopausal women under study.

TABLE VII

TYPE AND SIZE OF FAMILIES OF THE POST MENOPAUSAL WOMEN

S.No.	**Type of Family**	**Number**	**Per cent**
1	Nuclear	70	58.3
2	Joint	50	41.7
	Total	**120**	**100**
S.No	**Size of family**	**Number**	**Per cent**
1	<3	26	21.7
2	3 – 5	66	55.0
3	6 – 8	18	15.0
4	>8	10	8.3
	Total	**120**	**100**

From the table it is evident that 58. 3 per cent of families being the maximum were of nuclear type and only 41.7 per cent of them were joint families. This observation does not reveal the present trend of more of inclination towards nuclear families.

Considering the size of family, 21.7 per cent of the families had less than 3 members whereas 55 per cent had 3 – 5 members revealing that small family norms were observed among majority of the families. Among the families, 15 per cent had 5 - 8 members and 8.3 per cent had greater than 8 members in their family.

B.PHYSICAL ACTIVITY PATTERN OF POST MENOPAUSAL WOMEN

Table VIII depicts the details of physical activitypracticed by the post menopausal women.

TABLE VIII

PHYSICAL ACTIVITY PRACTISED BY THE POST MENOPAUSAL WOMEN

No.	Details	Number	Per cent
1	**Perform exercise**		
	Yes	55	45.8
	No	65	54.2
	Total	**120**	**100**
2	**Type of exercise**		
	Walking	38	31.7
	Yoga	17	14.1
	Total	**55**	**100**

From the survey it is noted that a maximum of 54.2 per cent of post menopausal women did not do any physical activity due to many physical problems mainly Joint/ leg pain. Only 45.8 per cent of women did some physical activity, among them 31.7 per cent were going for walking but not regularly, while the remaining 14.1per cent did Yoga as part of their regular household activities. None of them reported that they did the physical activity in a proper and regular way. With regard to duration of physical activity, it was reported to range from 30 minutes to one hour.

C.NUTRITIONAL STATUS OF POST MENOPAUSAL WOMEN

1. Height of post menopausal women

Table IX shows the details on the height of the surveyed post menopausal women

Height (in cm)	Number	Per cent	Age range	Standard Height* (cm)	Mean + SD	Number of women
120- 140	1	0.9	40- 44	151.2	154 +14.0	3
140– 150	30	25.0	44- 49	150.8	150.5 +7.7	11
151– 160	61	50.8	50- 54	150.3	151.4+7.7	18
>160	28	23.3	55- 59	149.7	152.3 +9.5	27
			60- 64	149.2	154 +9.5	16
			65 – 69	148.6	154.8 +9.5	19
			70 – 74	147.0	151.2 +9.5	11
			75 – 79	146.8	151.5 +4.8	15
Total		**120**	**100**	**Total**		**120**

*** ICMR, (2010)**

A maximum per centage(50.8) ofpost menopausal women had a height of 151 – 160 cms. Among others23.3 per cent of women had more than 160 cms in height and 25 per cent of women had 140 -150 cms.

According to ICMR (2010) the standard height varied as age increases revealing that slight reduction in height over the age is possible. The mean height of 40 – 44 yrs aged women was 154 which was found to be more than the reference height of 151.2 suggested by ICMR (2010). Post menopausal women of all other age groups were found to have a mean height more than ICMR (2010) values. The findings revealed that mean heights of majority of the selected women were found to be well above the normal values.

2. Weight of post menopausal women

Table X shows the details regarding the weight of the surveyed Post menopausal women

TABLE X

WEIGHT DETAILS OF POST MENOPAUSAL WOMEN

Weight (in kg)	Number	Per cent	Age range	Standard Weight* (kg)	Mean ± SD	Number of women
35 – 45	12	10.0	40- 44	46.2	62 ±15.7	3
46 – 55	30	25.0	44- 49	45.8	56± 18.3	11
56 – 65	44	36.7	50- 54	45.2	62.4 ±18.3	18
66 – 75	23	19.2	55- 59	44.1	62.5 ±12.1	27
76 - 85	6	5.0	60- 64	42.9	59.5 ±12.1	16
>85	5	4.1	65 – 69	42.6	62.1 ±12.1	19
			70 – 74	41.3	52.4 ±12.1	11
			75 – 79	41.1	53.4 ±8.6	15
Total		**120**	**100**	**Total**		**120**

***ICMR, (2010)**

It is seen from the table that 4.1 per cent of women weighed more than 85 kgs, followed by 5 per cent women weighing 76 – 85 kg and 19.2 per cent women with a weight range of 66 – 75 kg. A majority of 36.7 per cent were in the range of 56 – 65 kg revealing that nearly 65 per cent weighed more predisposing for problems in future. It is also observed that 25 per cent women weighed 46 – 55 kg range which is within desirable values. Nearly 10 per cent of women had weight ranging from 35 – 45 kg being the underweight category.

From the comparison Table with ICMR (2010) it is evident that all the surveyed women had weights more than the reference mean weight range of 41 – 46 kg. The mean weight of the surveyed women ranged from 52.4 to 62.5 kg revealing the obese nature of most of the women. These observations are very alarming since obesity related complications are possible among these post menopausal women.

3. Body Mass Index of post menopausal women

Table XI and Figure 4 shows the distribution of Body Mass Index values of Post menopausal women in comparison with WHO (2009) values.

TABLE XI

BODY MASS INDEX OF POST MENOPAUSAL WOMEN

S.No	Body Mass Index *	Category	Number	Per cent
1	Below 18.5	Underweight	8	6.7
2	18.5 – 22.9	Normal	35	29.2
3	23 – 24.9	Overweight	21	17.5
4	Above 25	Obese	56	46.7
	Total		**120**	**100**

***WHO, (2009)**

It is observed from the Table that only 29.2 per cent of women were in the normal weight category based on BMI classification, followed by 6.7 per cent in the underweight category. It is noted that 17.5 per cent of women were overweight. An alarming per centage that is 46.7 per cent of women belonged to obese category whereas 6.7 per cent of women were found to be in underweight category. The findings revealed that nearly 64.2 per cent of post menopausal women were found to be overweight or obese which may predispose them for various complications in later life.

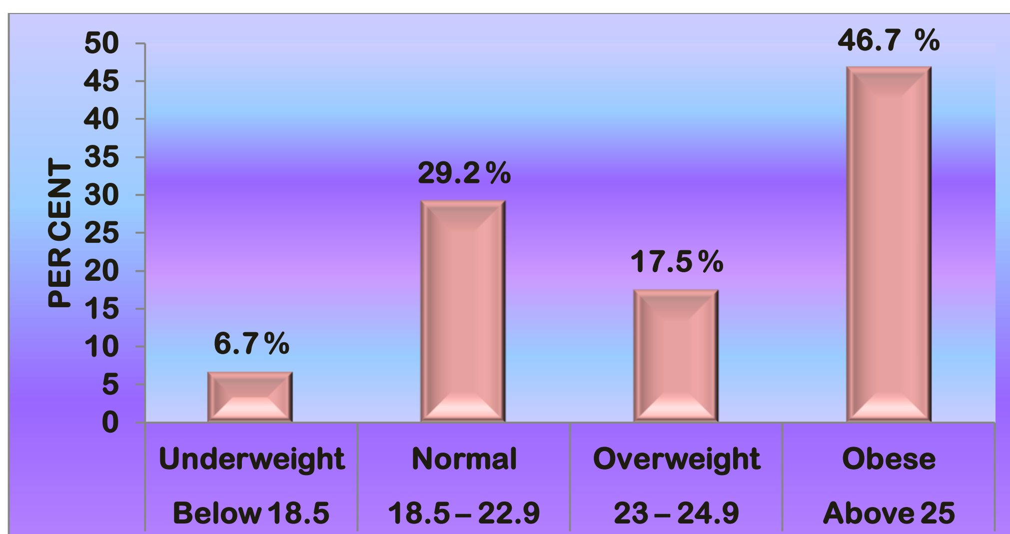

Figure 4

BODY MASS INDEX OF POSTMENOPAUSAL WOMEN

4. Waist to Hip ratio of post menopausal women

Table XII shows the Waist to hip ratio of the surveyed Post menopausal women

TABLE XII

WAIST TO HIP RATIO OF THE SELECTED POST MENOPAUSAL WOMEN

S.No	Waist to hip ratio	Number	Per cent
1	<0.9	68	56.7
2	>0.9	52	43.3
	Total	**120**	**100**

The ratio of Waist to Hip is an indicator of central obesity. Adult men with Waist to Hip ratio of ≥0.95 and women with ≥ 0.80 are considered as having Central Obesity (Bamji, 2006). In the present study about 43.3 per cent women were found to have Waist to Hip ratio greater than 0.9 and categorized as having central obesity which need to be considered and effective steps should be taken by such women to be healthy. The rest of 56.7 per cent had a ratio lesser than 0.9 revealing that they were in the normal category.

5. Clinical Examination

Table XIII depicts the clinical signs of post menopausal women

TABLE XIII

CLINICAL SIGNS OF POST MENOPAUSAL WOMEN

S.No	Parameters	Nutritional Status	Number*	Per cent
1	Hair	Normal Thin Brittle	24 85 11	20.0 70.8 9.2
		Total	**120**	**100**
2	Skin	Normal Rough and Dry	53 67	44.2 55.8
		Total	**120**	**100**
3	Eyes	Normal Pale	18 102	15.0 85.0
		Total	**120**	**100**
4	Teeth	Normal Dental Caries	88 32	73.3 26.7
		Total	**120**	**100**
5	Gums	Normal Bleeding	68 52	56.7 43.3
		Total	**120**	**100**
6	Musculature	Normal Poor	47 73	39.2 60.8
		Total	**120**	**100**
7	Edema	Absent Mild	109 11	90.8 9.2
		Total	**120**	**100**

***Multiple responses**

From the table it is seen that a maximum of 70.8 per cent of post menopausal women had thin hair and 9.2 per cent had brittle hair, whereas 20 per cent of women had normal hair. With regard to skin, 55.8 per cent of women had rough and dry skin while the remaining 44.2 per cent of women had normal skin. Dental caries was found among 26.7 per cent women followed by bleeding gums present among 43.3 per cent of women. Poor

musculature and edema were present among 60.8 per cent and 9.2 per cent women respectively.

In general, a moderate clinical status was observed among the surveyed post menopausal women.

6. Haemoglobin level of post menopausal women

Table XIV presents the haemoglobin level of a subsample of post menopausal women randomly selected for the study.

TABLE XIV

HAEMOGLOBIN LEVEL OF POST MENOPAUSAL WOMEN

(N = 20)

S.No	Hb range (g / dl)	Number	Per cent	Mean ± SD	Normal g / dl *
1	<11	3	15		
2	12 - 14	12	60	13.03 ± 1.2	12 – 14
3	>14	5	25		
	Total	**20**	**100**		

***WHO,(2010)**

Fromthe table it is evident that 15 per cent of the post menopausal women had reduced haemoglobin level less than 11 g/dl. A majority of 60 per cent women had 12 – 14 g /dl being the normal category whereas 25 per cent of women had more than 14 g / dl. The mean Haemoglobin level of all the post menopausal women was found to be 13.03 g/dl which is found to be within the normal range specified by WHO (2010) for women. The findings of the study revealed that post of the post menopausal women were not anaemic which is a welcome observation.

D. DIETARY PATTERN OF POST MENOPAUSAL WOMEN

1. Type of Diet and Meal pattern followed by post menopausal women

Table XV depicts the type of diet and meal pattern followed by post menopausal women

TABLE XV

TYPE OF DIET AND MEAL PATTERNAMONG POST MENOPAUSAL WOMEN

S.No	Food habits	Number	Per cent
	Type of diet		
1	Vegetarian	27	22.5
2	Ova – Vegetarian	50	41.7
3	Non – Vegetarian	43	35.8
	Total	**120**	**100**
	Meal Pattern		
1	2 meals	30	25.0
2	3 meals	62	51.7
3	4 meals	28	23.3
	Total	**120**	**100**

The table clearly indicates evident that a majority of 41.7 per cent of the surveyed women were ova – vegetarians, 35.8 per cent of women were non- vegetarian and 27 per cent were vegetarians. Considering the meal pattern majority of women were regularly consuming 3 meals a day whereas 23.3 per cent women had 4 meals a day. The remaining 25 per cent of women had only 2 meals a day.

2. Meal consumption pattern

Details regarding the regularity in meal consumption and the commonly skipped meals by post menopausal women is presented in Table XVI.

TABLE XVI

REGULARITY IN MEAL CONSUMPTION AND COMMONLY SKIPPED MEALS

S.No.	Details	Number	Per cent
	Regularity in Meal Consumption		
1	Regular in Diet	80	66.7
2	Skip Meals	40	33.3
	Total	**120**	**100**
	Type of Meal skipped		
1	Breakfast	12	30
2	Lunch	10	25
3	Dinner	8	20
4	Breakfast or Dinner	10	25
	Total	**40**	**100**

From the table it is evident that 66.7 per cent of women were regular in food intake while the remaining 33. 3 per cent women skipped meals due to the household works and improper appetite. Among those who skipped meals, a majority of 30 per cent skipped breakfast, 25 per cent skipped lunch, 20 per cent skipped dinner and 25 per cent of women skipped either breakfast or dinner. Skipping of meals was found among one – third of the selected women which may predispose them for dietary inadequacy.

3. Type of Beverage consumption by post menopausal women

Table XVII shows the type of beverage consumption by post menopausal women.

TABLE XVII

TYPE OF BEVERAGE CONSUMPTION BY POST MENOPAUSAL WOMEN

S.No	Type of Beverage	Number	Per cent
1	Milk	14	11.7
2	Coffee	26	21.7
3	Tea	78	65.0
4	No	2	1.7
	Total	**120**	**100**

Considering the type of beverage consumed by the women, a majority of 65 per cent consumed tea, followed by 21.7 and 11.7 per cent consuming coffee and milk respectively. Only 1.7 per cent women did not have the habit of consuming beverages. Tea was the beverage preferred by more per centage of women than coffee. During menopausal period Calcium depletion is possible and milk intake may be encouraged but only 11.7 per cent took milk daily. Among the 98 per cent of the surveyed post menopausal women, 50 per cent reported that they had the habit of consuming more than four cups of tea per day, while 19.2 per cent consumed more than four cups of coffee per day. The remaining 13.8 per cent women consumed either tea or coffee more than four cups per day. In general, the intake of tea or coffee was found to be on a higher side.

4. Food likes and dislikes during Menopausal period

There were no particular foods avoided during menopausal period. Similarly all the foods were taken as normal as that of the pre menopausal period.

5. Mean Food intake of post menopausal women

Table XVIII gives the mean food intake of the selected post menopausal women as assessed through 24 hour recall method for 3 days and compared with ICMR (2010) Recommended allowances.

TABLE XVIII

MEAN FOOD INTAKE OF POST MENOPAUSAL WOMEN

(N = 10)

S.No	Food items	ICMR * RDA (g / day)	Mean Intake (g)	Per cent Deficit / Excess
1	Cereals	270	337	+24.8
2	Pulses	60	63	+5.7
3	Green Leafy Vegetables	100	87	-13.0
4	Roots and Tubers	200	58	- 71.0
5	Other Vegetables	200	30	-85.0
6	Fruits	100	85	-15.0
7	Milk and Milk products	300	87	-71.0
8	Fats and Oils (visible)	20	27	+5.0
9	Sugar and Jaggery	20	21	0

***ICMR (2010)**

It is observed that the consumption of cereals by post menopausal women was in excess by about 24.8 per cent than the recommended allowance for adults. The same trend was followed for pulses of about 5.7 per cent excess. Considering theconsumption of green leafy vegetables andother vegetables a deficit of about 13 per cent and 71 per cent was observed respectively. The same deficit trend was followed for fruits, milk and milk products by 15 and 71 per cent respectively. The mean intake of fats and oils was found to be in excess by 5 per cent, whereas the consumption of sugar and jaggery was found to meet the recommended allowance for adults.

Overall observation is that, except for cereals, pulses, fats and oils and sugar and jaggery, intake of all other foods was found to be inadequate.

6. Mean Nutrient Intake of post menopausal women

Table XIX and Figure 5 depicts the mean nutrient intake of post menopausal women compared with Recommended Allowances (ICMR, 2010).

TABLE XIX

MEAN NUTRIENT INTAKE OF POST MENOPAUSAL WOMEN

(N = 10)

S.No	Nutrients	ICMR * RDA/Day	Mean Intake	Per cent deficit / excess
1	Energy (kcal)	2230	1850	-17.0
2	Protein (g)	50	42	- 16.0
3	Fat (g)	20	25	+25.0
4	Calcium (mg)	400	541	+35.3
5	Iron (mg)	14	25	+78.6
6	Carotene (µg)	4800	2411	-49.8
7	Thiamin (mg)	1.0	1.0	0
8	Riboflavin (mg)	1.1	1.0	-9.0
9	Niacin(mg)	12	13	+ 8.3
10	Ascorbic acid (mg)	40	76	+90

***ICMR (2010)**

From the table it is evident that the total calorie intake of women was deficit by 17 per cent. The mean intake of protein also followed the same trend with a deficit of 16 per cent. Considering the intake of fat and calcium an excess of 25 and 35.3 per cent was observed than the recommended allowance respectively. Iron intake was also found to be in excess of about 78.6 per cent than the recommended allowances which may be correlated with absence of anaemia among the selected women. Beta carotene intake showed a deficit of about 49.8 per cent than recommended allowances which was about 4800 g. The mean intake of thiamine was found to meet the recommended allowance. The mean intake of riboflavin showed a deficit of about 9.1 per cent whereas niacin showed an excess of 8.3 per cent. Vitamin

C was found to be in excess of about 90 per cent than the recommended allowance.

In general, the nutrient intake among the post menopausal women was found to be adequate in the case of fat, calcium, iron, thiamine and riboflavin whereas other nutrients did not meet the recommended allowances.

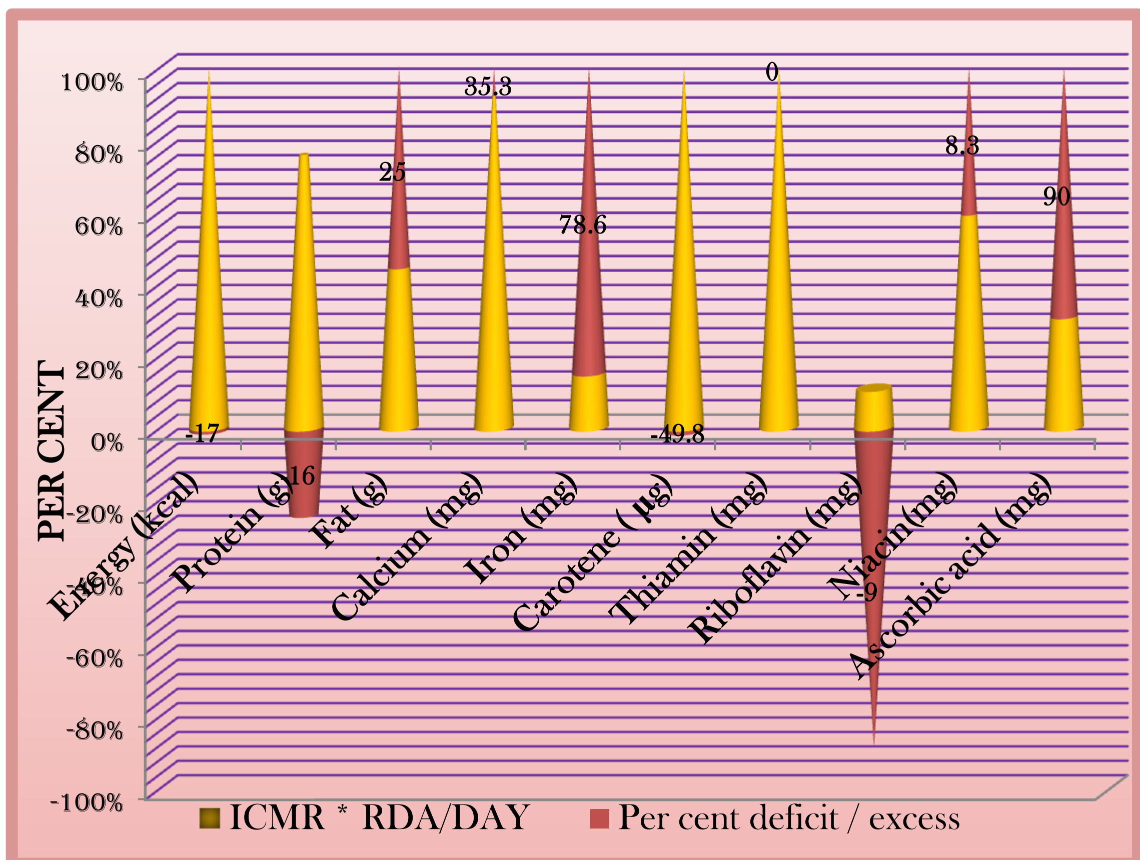

Figure 5

MEAN NUTRIENT INTAKE OF POST MEOPAUSAL WOMEN

7. Frequency of Food consumption by post menopausal women

Table XX depicts the details about the frequency of food consumption by post menopausal women

TABLE XX

FREQUENCY OF FOOD CONSUMPTION BY POST MENOPAUSAL WOMEN

S.No	Food items	Frequency	Number	Per cent
1	Cereals	Daily	120	**100**
		Total	**120**	**100**
2	Pulses	Daily Weekly	86 34	71.7 28.3
		Total	**120**	**100**
3	Other Vegetables	Daily Weekly Monthly twice Occasionally Never	78 25 17 - -	65.0 20.8 14.2 - -
		Total	**120**	**100**
2	Roots and Tubers	Daily Weekly Monthly twice Occasionally Never	56 45 14 3 2	46.7 37.5 11.7 2.5 1.7
		Total	**120**	**100**
3	Green Leafy Vegetables	Daily Weekly Monthly twice Occasionally Never	- 45 36 27 12	- 37.5 30.0 22.5 10.0
		Total	**120**	**100**
4	Fruits	Daily Weekly Monthly twice Occasionally Never	- 34 56 12 18	- 28.3 46.7 10.0 15.0
		Total	**120**	**100**
5	Milk and Milk products	Daily/once in two days Weekly Occasionally Never	27 24 - 69	22.5 20.0 - 57.5
		Total	**120**	**100**

6	Egg	Daily Weekly Monthly twice Occasionally Never	- 14 21 15 70	- 11.7 17.5 12.5 58.3
		Total	**120**	**100**
7	Meat and Poultry	Daily Weekly Monthly twice Occasionally Never	- 12 24 7 77	- 5.8 10 20 64.2
		Total	**120**	**100**
8	Fish and Dry Fish	Daily Weekly Monthly twice Occasionally Never	- 15 24 4 77	**-** 12.5 20 3.3 64.2
		Total	**120**	**100**

From the table it is evident that all the women consumedcereals daily. The frequency of consumption of pulses was found to be more on all the days among 71.7 per cent of women whereas 28.3 per cent of women consumed pulses weekly once. Other vegetables were consumeddaily by 65 per cent women, when compared with 20.8 per cent and 14.2 per cent women who consumed vegetables weekly once and twice in a month respectively.

In terms of roots and tubers, 37.5 per cent of women consumed weekly once followed by 11.7 per cent women who consumed twice a month. Nearly 1.7 per cent women did not consume tubers due to flatulence problem and indigestibility. Green leafy vegetables were consumed mostly when it was seasonally available, 37.5 per cent of women consumed leafy vegetables weekly once, 30 per cent consumed twice a month and 22.5 per cent consumed occasionally and 10 per cent of women never consumed greens.

The consumption pattern of fruits was found to be in majority twice a month among 46.7 per cent of women, followed by 28.3 per cent weekly and 10 per cent occasionally. Nearly 15 per cent of women never consumed fruits due to their financial and health status. The consumption of milk and milk

products daily or once in two days was found to be more among 22.5 per cent women when compared with 20 per cent women who consumed daily and the remaining 57.5 per cent of women never consumed milk and milk products.

Egg consumption was twice in a month found to be higher among 17.5 per cent of women, followed by 12.5 and 11.7 per cent women who consumed egg occasionally and weekly once whereas 58.3 per cent women never consumed egg. Meat consumption was higher among 20 per cent women whose frequency was twice in a month, followed by 5.8 and 10 per cent whose frequency of consumption was weekly and occasionally respectively. About 12.5 per cent women consumed fish weekly once, 20 per cent consumed twice a month, 3.3 per cent consume occasionally and 64.2 per cent women never consumed fish as they were vegetarian.

E. GYNECOLOGICAL DETAILS AND HEALTH STATUS OF POST MENOPAUSAL WOMEN

1. Age at first conception

Table XXI gives the details about the age at first conception of the surveyed women.

TABLE XXI

AGE AT FIRST CONCEPTION OF THE WOMEN

S.No	Age range (yrs)	Number	Per cent
1	12 – 15	9	7.5
2	16 – 20	48	40.0
3	21 - 25	39	32.5
4	26 – 30	14	11.7
5	31 – 35	10	8.3
	Total	**120**	**100**

The table depicts that a maximum of 40 per cent women had their first conception at the age of 16 – 20 years being early marriages and 32.5 per cent of women had at the age of 21 – 25 years. Among the women 11.7 per cent had their first conception at the age of 26 – 30 years. It is also observed that a lesser per cent of 8.3 had their first conception at the age of 31 -35

years. It is very sad to note that 7.5 per cent of women had their first conception below the age of 15 years.

2. Number of children born to post menopausal women

Table XXII shows the number of children born to post menopausal women

TABLE XXII

NUMBER OF CHILDREN OF POST MENOPAUSAL WOMEN

Number of Children	Number of women	Per cent
1	12	10.0
2	32	26.7
3	16	13.3
4	6	5.0
5	54	45.0
Total	**120**	**100**

From the table it is evident that 10 per cent of women had one child, whereas 26.7 per cent had two children, 13.3, 5 and 45 per cent of women had three, four and five children respectively. Out of a total of 418 children born to those women, 198 were male children and 220 were female children

3. Interval between each conception

Table XXIII shows the interval between each conception among the selected post menopausal women.

TABLE XXIII

INTERVAL BETWEEN EACH CONCEPTIONAMONG THE WOMEN

S.No	Interval (yrs)	Number	Per cent
1	1 – 5	79	65.8
2	6 – 10	21	17.5
3	11 – 15	20	16.7
	Total	**120**	**100**

A maximum of 65.8 per cent of post menopausal women had an interval of 1- 5 years whereas an equal per centage of women had an interval of 6 – 10 years and 11 – 15 years interval between each conception.

4. Nature of Delivery among the women

Table XXIV depicts details about the nature of deliveries reported among post menopausal women

TABLE XXIV

NATURE OF DELIVERY AMONG THE WOMEN

S.No	Nature of delivery	Number	Per cent
1	Normal	75	62.5
2	Caesarian	40	33.3
3	Normal and Caesarian in multiple pregnancies	5	4.2
	Total	**120**	**100**

Fromthe Table, it is seen that the nature of delivery of 62. 5 per cent of women was found to be normal, 33.3per cent had Caesarian and the remaining 4. 2per cent had both normal and caesarian delivery during more than one delivery. It is a welcome observation that 62.5 per cent had normal deliveries

5. Type of Complications during pregnancy

It is revealed from the survey that increased water content (amniotic fluid) in the uterus and Pregnancy Induced Hypertension were the complications expressed by two woman each during pregnancy. Nearly 4.2 per cent of women suffered from gestational diabetes during pregnancy while the others did not face any problems.

6. Age at Menopause

Table XXV gives details about the age at menopause among the selected post menopausal women.

TABLE XXV

AGE AT MENOPAUSE AMONG THE SELECTED WOMEN

S.No	Age at Menopause (yrs)	Number	Per cent
1	30 – 35	7	5.8
2	36 – 40	15	12.5
3	41 – 45	46	38.3
4	46 – 50	20	16.7
5	51 – 55	32	27.7
	Total	**120**	**100**

Kamla-Raj (2011) reported that the average age of menopause in the western world is 51 years while in India it is 44.3 years and the normal age range for the occurrence of menopause is somewhat between the age of 45 and 55.From the table the age of onset of menopause was found to be at an early age of 30 – 35 years for about 5.8per cent of women among which only 2.5 per cent was natural menopause and the remaining was surgical menopause.Nearly 12.5 per cent of women experienced menopause at an age of 36 – 40 years. A majority of 38. 3 per cent had at an age range of 41 – 45 years and 16.7per cent had at an age range of 46 – 50 years and the remaining 27. 7 per cent had menopausal onset at a later age of 51- 55 years. Except for a lesser percentage of women at an earlier onset of menopause, many of the women had normal occurrence of menopause.

7. Symptoms of Menopause

Table XXVI and Figure 5 and 6 presents the symptoms felt by the women during Menopause.

TABLE XXVI

SYMPTOMS OF MENOPAUSE FELT BY THE SELECTED WOMEN

S.No	Symptoms	Number*	Per cent
	Physical symptoms		
1	Hot flashes	6	5.0
2	Night sweats	10	8.3
3	Sweating	7	5.8
4	Vaginal discharge	5	4.2
5	Feeling anxious/ Nervous	11	9.2
6	Flatulance	7	5.8
7	Bloated	8	6.7
8	Muscle and Joint pain	48	40.0
9	Sleeplessness	14	11.7
10	Dry Skin	6	5.0
11	Weight gain	11	9.2
12	Increased facial hair	5	4.2
13	Frequent Urination	56	46.7
14	Involuntary Urination during Coughing or Laughing	11	9.2
15	Decreased Stamina	15	12.5
16	Feeling tired	19	15.8
	Psychological symptoms		
1	Memory lapses	24	20.0
2	Impatient with others	7	5.8
3	Wanting to be alone	5	4.2
4	Depression	39	32.5

Menopausal symptoms of women revealed that physical symptoms were more common than the psychological symptoms. Considering the physical symptoms, most of the women, about 40 per cent experienced. Muscle and Joint pain during menopause transition and frequent urination was the common symptom among 46.7 per cent of women. Other symptoms reported by the women included feeling tired, decreased stamina, sleeplessness, weight gain and involuntary urination during coughing and laughing. With regard to psychological symptoms, depression was the most common symptom felt by 32.5 per cent women and memory lapses by 20 per

cent women. Becoming impatient and wanting to be alone were other symptoms reported.

Joint and Back pain was the major symptom which the women faced even during their post menopausal period. Some women felt anxious and are impatient with others only during their post menopausal period rather than in the menopausal time.

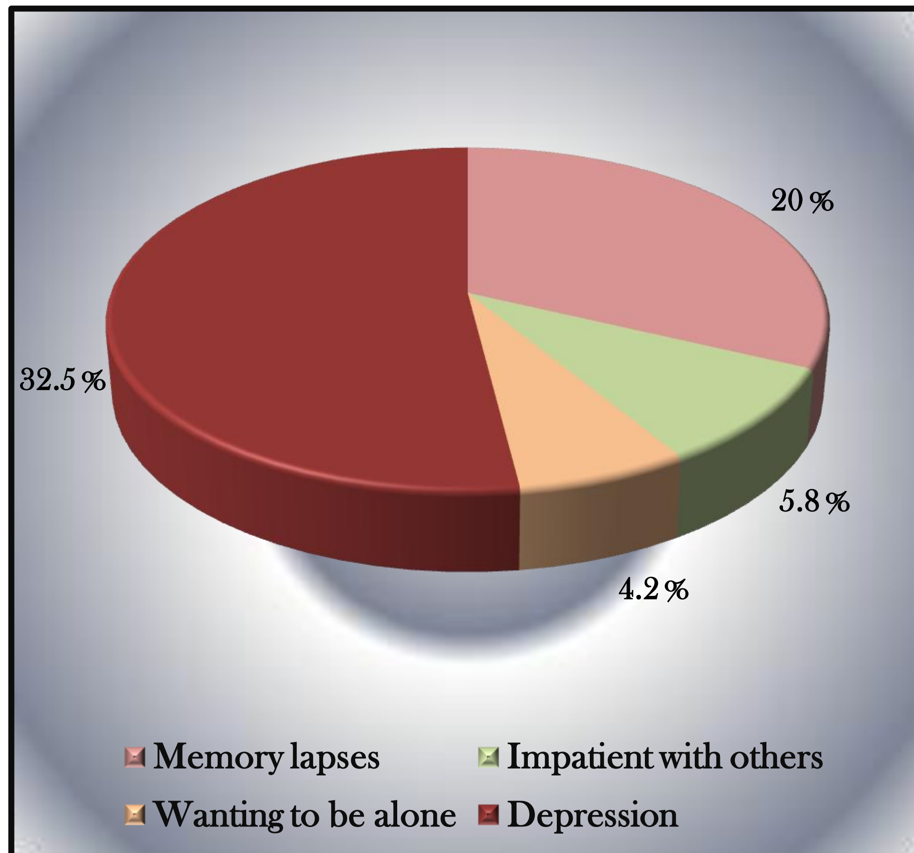

Figure 6

PSYCHOLOGICAL SYMPTOMS FELT DURING MENOPAUSE

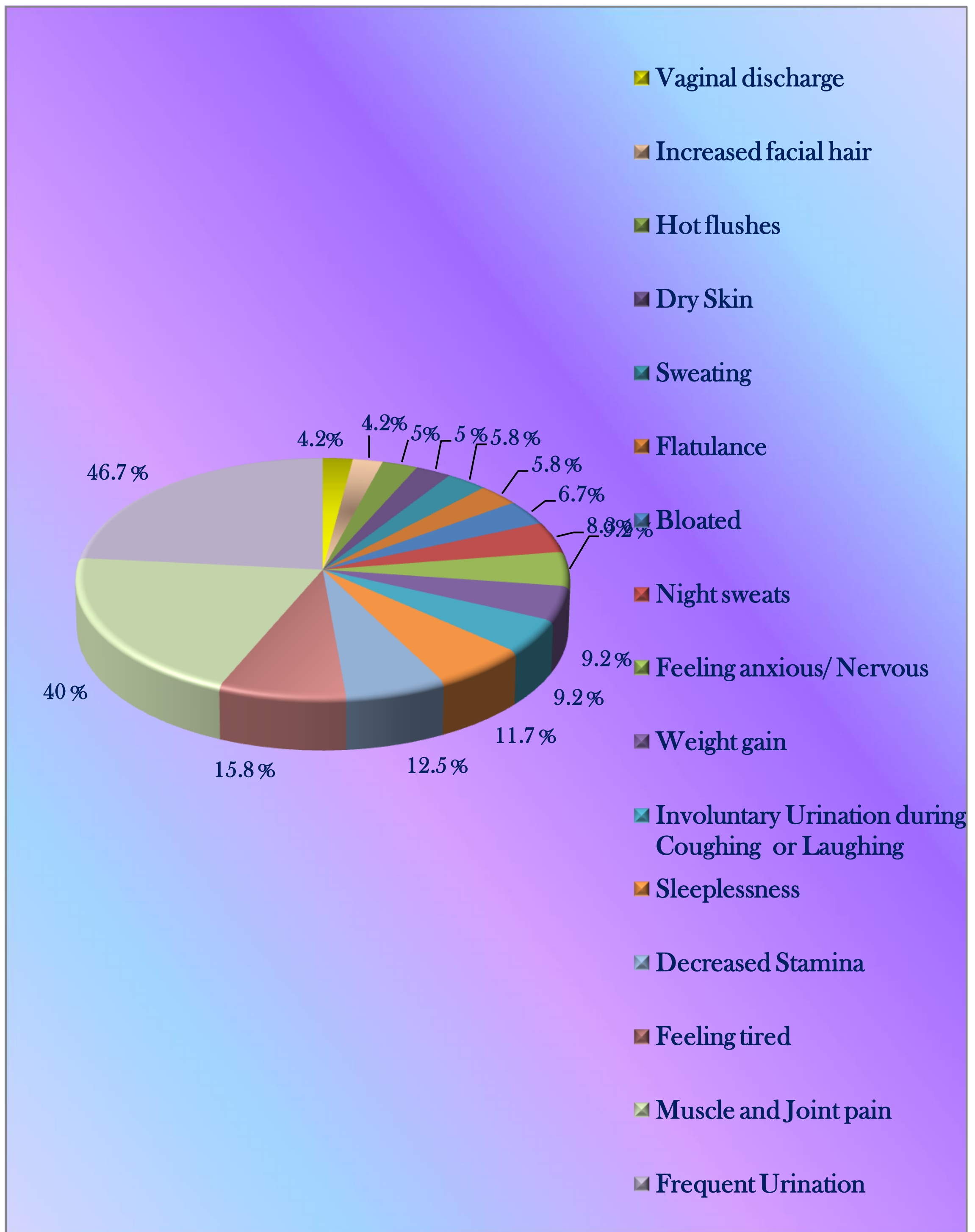

Figure 7

PHYSICAL SYMPTOMS FELT DURING MENOPAUSE

8. Remedies taken to overcome symptoms

Table XXVII depicts the remedies taken to overcome menopausal symptoms by the women

TABLE XXVII

REMEDIES TAKEN BY MENOPAUSAL WOMEN TO OVERCOME SYMPTOMS

S.No	Remedies	Number	Per cent
1	Medicines	5	4.2
2	Exercise	4	3.3
3	Yoga	8	6.7
4	Dietary modifications	10	8.3
5	None	93	77.5
	Total	**120**	**100**

Majority that is 77.5 per cent of women did not take any remedies to overcome the menopausal symptoms. Food modification and yoga were adopted by 8.3 and 6.7 per cent of women respectively. Others resorted to exercise and took medicines to overcome the menopausal symptoms.

9. Medicines taken for menopausal symptoms

Medical treatment for menopause was not that much familiar/ famous and also the selected women were unaware about the availability of medicines. The other reason was that those women were least bothered about menopause and symptoms as they were busy with their own routine life. Only 4.2 per cent of women took medicines for the relief of menopausal symptoms which mainly included medicines for joint and back pain. There was no particular medicine taken by the women in order to relieve the other symptoms.

10. Benefits of the remedial measures

As there were no medical treatments taken, there were no benefits experienced by the menopausal women. Those who took medicines for joint and back pain felt relieved from that symptom but the drawback was that the medicines have to be taken continuously for pain relief.

11. Surgeries underwent by post menopausal women

The survey findings revealed that 5.8 per cent of women underwent Oopherectomy, 10 per cent removed uterus and 7.5 per cent of women underwent both Oopherectomy and hysterectomy. A maximum per centage (76.7 %) did not undergo any surgery due to menopausal problems.

12. Other details

There were not much awareness among the women about hormonal treatment. None of the selected women population underwent Hormonal therapy.

Maximum per cent (90 %) of women underwent Family planning operation as a contraceptive measure. Oral contraceptive pills were not taken by any of the women.

13. Prevalence of disease among post menopausal women

Table XXVIII depicts the prevalence of disease among post menopausal women

TABLE XXVIII

PREVALENCE OF DISEASE AMONG POST MENOPAUSAL WOMEN

S.No	Disease	Number*	Per cent
1	Obesity	56	46.7
2	Diabetes Mellitus	28	23.3
3	Blood pressure	23	19.2
4	Bone and Joint pain	20	16.7
5	No disease	12	10.0
6	Heart disease	10	8.3
7	Osteoporosis	5	4.2
8	Arthritis	4	3.3
9	Uterine fibroid	2	1.7
10	Thyroidism	2	1.7

*** Multiple responses**

It is seen from the Table that obesity was the most prevalent problem among 46.7 per cent of women which was succeeded by Diabetes Mellitus, Blood pressure, Bone and Joint pain among 23.3, 19.2, and 16.7 per cent respectively. Osteoporosis and arthritis were also reported among a lesser per centage of women that is 4.2 and 3.3. Minimum per centage of women reported about uterine fibroid and thyroid. It is welcoming to note that 10 per cent of women did not have any diseases.

14. Age of onset of disease

Table XXIX presents the age of onset of the disease of post menopausal women

TABLE XXIX

AGE OF ONSET OF THE DISEASE OF POST MENOPAUSAL WOMEN

S.No	Age (yrs)	Number	Per cent
1	30 – 40	25	23.2
2	41 – 50	51	47.2
3	Above 50	32	29.6
	Total	**108**	**100**
1	Before Menopause	33	30.6
2	After Menopause	75	69.4
	Total	**108**	**100**

It is seen from the table that among those who had the disease, 23. 2 per cent of women had the onset of disease at an age range of 30 – 40 years, 47.2 per cent of women had the disease started at the age of 41 – 50 years and 29.6 per cent of women had after the age of 50 years. Onset of disease was more among women after 40 years.

Considering the phase of disease onset 30.6 per cent of women had the disease before menopause and 69.4 per cent had after menopause.

15. Hereditary details of disease among post menopausal women

Table XXX depicts the hereditary details of disease among post menopausal women

TABLE XXX

HEREDITARY DETAILS OF THE DISEASE OF POST MENOPAUSAL WOMEN

Hereditary details		Number*	Per cent
Osteoporosis	Father	-	-
	Mother	3	60
	Non hereditary	2	40
	Total	**5**	**100**
	Father	1	25

Arthritis	Mother	2	50
	Non hereditary	1	25
	Total	**4**	**100**
Diabetes Mellitus	Father	8	28.6
	Mother	12	42.9
	Grand father	-	-
	Grand Mother	3	10.7
	Non hereditary	5	17.9
	Total	**28**	**100**
Bone and Joint pain	Father	**-**	-
	Mother	8	40.0
	Grand father	-	-
	Grand Mother	5	25
	Non hereditary	7	35
	Total	**20**	**100**
Blood Pressure	Father	13	56.5
	Mother	10	43.5
	Total	**23**	**100**
Uterine Fibroid	Non hereditary	2	100
Obesity	Father	22	39.3
	Mother	34	60.7
	Total	**56**	**100**
Thyroidism	Non hereditary	2	100

***Multiple responses**

Blood pressure, Arthritis, Obesity and Diabetes Mellitus as seen from the table were the major diseases which were acquired hereditarily. Uterine fibroid was not acquired hereditarily as reported by the women.

SUMMARY AND CONCLUSION

V.SUMMARY AND CONCLUSION

Menopause is an universal event in the life cycle of each women during which there is decline in the ovarian function resulting in permanent cessation of menstrual cycle. Post Menopause is the stage following menopause and generally starts between 24 and 36 months after a women's last period. Outwardly, the most marked difference between menopause and post menopause is the reduction in symptoms - for instance hot flashes are less frequent and not as powerful. A woman is also considered post menopausal after the removal of the ovaries because it effectively ends menstrual bleeding.Menopause cause physiological and psychological changes in women which have an impact on food intake and food choices. It is an established fact that a well balanced diet is important for good health and to combat some of the complications of menopause to certainextent. Apart from a nutritious diet an active life style which includes exercise pattern is acure for a troublefree menopause. Regular exercise benefits the heart and bones, helps toregulate weight and contributes to a sense of overall well being and improvement in mood.

Bearingthe above points in mind the present study "**Nutritional Status and Dietary Pattern of Post Menopausal Women in Coimbatore**" was carried out with the following objectives:

- To study the Socio- Economic background of selected post menopausal women.
- To assess their nutritional status in terms of anthropometric, clinical and biochemical methods.
- To find out the food and nutrient intake to assess the adequacy.
- To study the occurrence of menopausal problems and non-communicable disease among post menopausal women.

The present study was carried out among 120 women of 40 yrs and more in Coimbatore. Three urban areas namely Machampalayam, Kurumbapalayam and Sundarapuram were selected for the survey. Socioeconomic and other details were collected using an interview schedule. Nutritional status was assessed through anthropometric measurements like height, weight, BMI, Waist Hip ratio,dietary pattern through recall method haemoglobin estimation on a subsample and clinical examination.Details on menopausal symptoms experienced, prevalence of disease and treatment measures were also collected.

The salient findings of the present study are given as follows:

- Among the surveyed post menopausal women, a majority of 38.3 belonged to the age group of 51 – 60 years anda least percentage of 16.7 % belonged to the age group of 71 – 80 years.
- Considering the marital status, 41.7 per cent of the post menopausal women were married, 35 per cent of the women were widows and the remaining 23.3 per cent were living alone as they were divorced.
- A majority of 45 per cent of post menopausal women were illiterates whereas a least per centage of 2.5 had studied upto professional courses followed by undergraduate education by 25 per cent of women. Others had done some form of school education.
- A majority of the post menopausal women (74.2 %) were home makers as they were aged and not in a position to take up jobs and the remaining 25.8 per cent were working in various government or private sectors or engaged in business.
- Majority of the working women were coolie workers (67.7%) and earned less than Rs.3000 per month, 6.5 per cent owned a business and were earning Rs. 7000 – 10,000 per month. 16.1 per cent were earning Rs. 3500 – 7000 per centand only 9.7 per cent were professionals with an income of more than Rs.10,000.

- Among them 2.5 per cent of women belonged to sedentary type of activity, 75.8 per cent were of moderate category and the remaining 21.7 per cent belonged to the heavy working category.
- A maximum of 56.7 per cent families had low income in the range of Rs 3000 – 7000, 29.2 per cent of families earned Rs 7000 to 10,000 per month. Only 10 per cent of families had more than Rs. 10,000 whereas 4 per cent of families had less than Rs. 3000 per month.
- A maximum per cent 74.2 per cent of women who were unable to work due to reasons such as ageing, illness, etc., relied on the family resources for their livelihood. Nearly 25.9 per cent of women were earning on their own, while 8.3 per cent each received their income through pension schemes or through Investments such as bank interests.
- A maximum percentage (58.3 %) of women was living in nuclear type and only 41.7 per cent of them were Joint families.
- A majority of 54.2 per cent of post menopausal women did not do any physical activity due to their inability. Only 45.8 per cent of women did some physical activity, among them 31.7 per cent were going for walking but not regularly, while the remaining 14.1per cent did yoga as part of their regular household activities. None of them reported that they did the physical activity in a proper and regular way.
- About 50.8 per cent of post menopausal women had a height of 151 – 160 cms. Among others 23.3 per cent of women had more than 160 cms in height and 25 per cent of women had 140 -150 cms.The findings revealed that the mean height of the selected women was found to be within normal values suggested by ICMR (2010).
- All the surveyed women had weights more than the reference ICMR (2010) mean weight range of 41 – 46 kg. The mean weight of the surveyed women ranged from 52.4 to 62.5 kg revealing the obese nature of most of the women. These

observations are very alarming since obesity related complications are possible among these post menopausal women.

- Only 29.2 per cent of women were in the normal weight category based on BMI classification. An alarming per centage of 46.7 per cent of women belonged to obese category whereas 6.7 per cent of women were found to be in underweight category, 17.5 per cent of post menopausal women were found to be overweight or obese which may predispose them for various complications in later life.
- About 43.3 per cent of women had waist to hip ratio greater than >0.9 whereas the rest 56.7 per cent of women had the ratio lesser than >0.9.
- A majority of 70.8 per cent of post menopausal women had thin hair and 55.8 per cent of women had rough and dry skin. Dental caries was found among 26.7 per cent women and bleeding gums was seen among 43.3 per cent of women. Poor musculature and edema were present among 60.8 per cent and 9.2 per cent women.
- Haemoglobin levels indicated that a majority of 60 per cent women had 12 – 14 g /dl being the normal category whereas 25 per cent of women had more than 14 g / dl and 15 per cent had reduced haemoglobin level less than 11 g/dl.
- A majority of 41.7 per cent of the surveyed women were ova – vegetarians, 35.8 per cent of women were non- vegetarians and 27 per cent were vegetarians.
- Majority of women were regularly consuming 3 meals a day. Food intake was regular among 66.7 per cent of women were regular in food intake while 33. 3 per cent women skipped meals due to the household works and improper appetite. Among them a majority of 30 per cent skipped breakfast, 25 per cent skipped lunch, 20 per cent skipped dinner and 25 per cent of women skipped either breakfast or dinner.

- Considering the type of beverage consumption, a majority of 65 per cent women consumed tea, 21.7 and 11.7 per cent consumed coffee and milk respectively and a least per centage of (11.7%) took milk daily. Only 1.7 per cent women did not have the habit of consuming beverages.
- Fifty per cent of women had the habit of consuming more than four cups of tea per day, while 19.2 per cent consumed more than four cups of coffee while the remaining 13.8 per cent women consumed either tea or coffee in excess. Amaximum per cent of 57.5 per cent of women never consumed milk.
- There were no particular foods avoided or included during Menopausal period.
- Consumption of cereals, pulses and fats and oil seeds was found to be in excess than the recommended allowances by 24.8,5.7 and 5 per cent respectively. While the consumption of sugar and jaggery was adequate with RDA. Consumption of green leafy vegetables,roots and tubers, other vegetables, fruits, milk and milk products was found to be deficit.
- The intake of fat, calcium and iron was found to be in excess by 25, 35, 76 per cent respectively, whereas in the consumption of total calorie, protein and beta carotene a deficit of 17, 16, 49 per cent was observed respectively. Thiamine intake was found to be adequate whereas niacin and riboflavin was found to be deficit.
- Being early married 40 per cent of women had their first conception at the age of 16 – 20 years and 32.5 per cent of women had at the age of 21 – 25 years, 11.7 per cent had at the age of 26 – 30 years. It is also observed that a lesser per cent of 8.3 had their first conception at the age of 31 -35 years. It is very sad to note that 7.5 per cent of women had their first conception below the age of 15 years.
- Among them 10 % of women had one child, whereas 26.7 per cent had two children, 13.3, 5 and 45 per cent of women had three, four and five children respectively. Out of a total of 418

children born to those women, 198 were male children and 220 were female children

- A maximum of 65.8 per cent of post menopausal women had an interval of 1- 5 years whereas an equal percentage of women had an interval of 6 – 10 years and 11 – 15 years interval between each conception.
- Regarding the type of delivery, 62. 5 per cent of women had normaldelivery, 33.3per cent had Caesarian and the remaining 4. 2per cent had both normal and caesarian delivery during more than one delivery.
- Increased water content (amniotic fluid) in the uterus and Pregnancy Induced Hypertension were the complications expressed by two women. Nearly 4.2 per cent of women suffered from gestational diabetes during pregnancy while the others did not face any problems.
- Except for a lesser percentage of women at an earlier onset of menopause many of the women had normal occurrence of menopause. A majority of 38. 3 per cent had at an age range of 41 – 45 years and 16.7per cent had at an age range of 46 – 50 years and the remaining 27. 7 per cent had at a later age of 51-55 years.For 5.8per cent of women menopausal onset was at an earlier age of 30 – 35 years among which only 2.5 per cent was natural menopause and the remaining was surgical menopause
- Menopausal symptoms of women revealed that physical symptoms were more common than psychological symptoms. Among the physical symptoms, about 40 per cent women experienced Muscle and Joint pain,and 46.7 per cent had frequent urination was the common symptom. Other symptoms included feeling tired, decreased stamina, sleeplessness, weight gain and involuntary urination during coughing and laughing.
- With regard to psychological symptoms, depression was the most common symptom felt by 32.5 per cent women and memory lapses by 20 per cent women. Becoming impatient and wanting to be alone were other symptoms reported.

- Joint and Back pain was the major symptom which the women faced even during their post menopausal period. Some women felt anxious and are impatient with others only during their post menopausal period rather than in the menopausal time.
- Majority of 77.5 per cent of women did not take any remedies to overcome the menopausal symptoms. Food modification and yoga were adopted by 8.3 and 6.7 per cent of women respectively. Others resorted to exercise and took medicines to overcome the menopausal symptoms.
- Medical treatment for menopause was not that much familiar/ famous and women were least bothered about menopausal symptoms. Only 4.2 per cent of women took medicines for the relief of menopausal symptoms which mainly included medicines for back and joint pain.
- Findings also revealed that 5.8 per cent of women underwent Oopherectomy, 10 per cent removed uterus and 7.5 per cent of women underwent both Oopherectomy and hysterectomy. A maximum percentage (76.7 %) did not undergo any surgery due to menopausal problems. About 90 per cent of women underwent Family planning operation.
- Blood pressure, Arthritis, Obesity and Diabetes Mellitus were the major diseases which were acquired hereditarily. Uterine fibroid was not acquired hereditarily as reported by the women.

Based on the findings of the study some recommendations are made as follows.

- College students can organize seminars among women above 40 years of age about post menopausal period and importance of calcium for their healthy life.
- Awareness programme among for family members can be arranged about the psychological changes of women during menopause and guide them to improve the health status of women and to cope with stress.

- Primary Health Care centers can organize on a therapeutic measure laughing therapy, breathing exercises and counseling on stress relieving foods among menopausal women.
- Stakeholders can distribute pamphlets regarding the low cost, nutritious, calcium rich recipes to the menopausal women.
- The importance of greens and other calcium rich foods can be advertised through television, radio, social networks at times when most women are watching to prevent osteoporosis and other bone related problems by the government.
- Hormone Replacement Therapy can be done free of cost for menopausal women who face difficulty in handling the symptoms or in severe cases by the Government.

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APPENDICES

APPENDIX – I

INTERVIEW SCHEDULE TO ASSESS THE NUTRITIONAL STATUS AND INFLUENCE OF DIET ON POST MENOPAUSAL WOMEN

I.SOCIO-ECONOMIC SURVEY

1. Name:

2. Age:

3. Marital Status: ☐ Married ☐ Unmarried ☐ Widow ☐ Divorcee

4. Educational Qualification:

5. Occupation:

6. If working, specify the Type of Work:
   Sedentary ☐rk Moderate W☐ Heavy Wor☐

7. Source of Income: ☐ Salary Pension ☐ Family Resources ☐ Investments ☐ Others ☐

8. Type of Family: N☐ar J☐

9. Size of Family:

<3 ☐ 3-5 ☐ 5-8 ☐ >8 ☐

II.ANTHROPOMETRIC ASSESSMENT

1. 12.Height(cms):
2. 13.Weight(kg):
3. 14.Body Mass Index(BMI):
4. 15.Waist to Hip Ratio:

III.PHYSICAL ACTIVITY PATTERN

1. Do you follow any Exercise/Yoga? ☐ Yes ☐ No

S.NO.	TYPE OF EXERCISE/YOGA	FREQUENCY			DURATION
		DAILY	WEEKLY	MONTHLY	

2. 17. If Yes Specify.

IV.DIETARY ASSESSMENT

1. Dietary Habit: ☐ Vegetarian ☐ Non- Vegetarian ☐ Ova Vegetarian
2. Daily Meal Pattern: ☐ 2 meals/day ☐ 3 meals/day ☐ 4 meals/day
3. Do you drink Milk/Coffee/Tea? ☐ Yes ☐ No
4. Do you drink more than 4 cups of Tea/Coffee per day?

5. Do you consume Milk daily?
6. Do you eat Meals regularly?
7. Do you skip any meals?
8. If yes Which Meals? ☐ Breakfast ☐ Lunch ☐ Dinner
9. Which foods you avoided in general during Post Menopausal period?
10. Which foods you prefer more in general during Post Menopausal period?
11. 24 hours recall.

Early morning	**Breakfast**	**Lunch**	**Tea time**	**Dinner**

12. How frequently do you consume the following foods?

S. No.	**FOOD ITEMS**	**DAILY**	**WEEKLY ONCE**	**TWICE A WEEK**	**THRICE A WEEK**	**OCCASIONALLY**
1	**CEREALS** Rice Ragi Wheat Millet Bread Pasta Others					
2	**PULSES** Bengal Gram Dhal Black Gram Dhal Red Gram Dhal Green Gram Dhal Chick Peas Soyabean					
3	**VEGETABLES** Brinjal Beans Lentils Ladies Finger Tomato					
4	**ROOTS AND TUBERS** Potato Carrot Beeroot Yam Sweet Potato					
5	**GREEN LEAFY VEGEABLES** Amaranth leaves					
6	**FRUITS** Grapes Papaya Banana Mango Pomegranate					

7	**OTHERS** Milk and Milk Products Sugar Jaggery Egg Mutton Chicken Fish Herbal Tea Ghee Butter Palm Oil					

V.HEALTH STATUS

1. Age at First Conception:
2. Interval between each Conception ?
3. How many childrens do you have? ☐ Male ☐ Female
4. Indicate the nature of deliveries you had? ☐ Normal ☐ Caesarian
5. Did you face any complications during Pregnancy?
6. Mention the age at Menopause?
7. Indicate the symptoms you felt during Menopause.

☐ Hot Flashes ☐ ght Sweats ☐ ating
☐ Vaginal Discharge ☐ Flatulence ☐ Feeling Anxious/Nervous
☐ Memory lapses Dry S ☐ Weigh ☐ n
☐ Impatient with other people ☐ Sleeplessness ☐ Muscle & Joint pain
☐ Wanting to be alone ☐ eeling Tired ☐ eling Bloated
☐ Pain in Back, Neck, Head ☐ requent Urination ☐ reased Facial hair
☐ Decrease in Physical strength & Stamina
☐ Involuntary Urination during Laughing or Coughing

8.Do you have these symptoms still?

8. What are the remedies you take to overcome the above problems?
   ☐ Medicines ☐ Exercise ☐ Yoga ☐ Dietary modifcations
9. Do you take any medicines?
10. Have you benefited by these remedial measures?
11. Have you undergone anysurgery?
    ☐ Removal of Ovary ☐ thers. ☐ emoval of Uterus ☐ Both
12. Have you take Oestrogen for Menopausal women?
13. Have you ever taken birth control pills in your life?

14. (even any of the Oral Contraceptive)
15. Have you undergone any Hormone Replacement Therapy?
16. If Yes, at what age you had Hormone Replacement Therapy?
17. Have you experienced any side effects due to HRT?
18. Do you suffer from any Disease/ illness?

☐ Osteoporosis ☐ Arthritis ☐ Bone & Joint pain

☐ Heart DiseaseBlood Pres ☐ Obesity ☐

☐ Diabetes Mellitus ☐ rine Fibroid

19. .From which age do you have the above disease?
20. .Do you have Parental/Heredity of the above disease?
21. Was it after Menopause or earlier? ☐ Yes ☐ No ☐ Partially

APPENDIX - 2

PHYSICAL SYMPTOMS	NONE(0)	MILD(1)	MODERATE(2)	SEVERE(3)
Hot flashes				
Night sweats				
Palpitations				
Irregular periods				
Cystitis / stress incontinence				
Vaginal dryness				
Vaginal irritation				
Weight gain				
Thinner skin and hair				
Headaches				
Loss of muscle tone				
Fatigue / joint pains				
Constipation or Irritable Bowel Syndrome				
Periodontal (dental) disease				
PSYCHOLOGICAL SYMPTOMS	**NONE(0)**	**MILD(1)**	**MODERATE(2)**	**SEVERE(3)**
Insomnia				
Depression				
Anxiety				
Poor Memory/Consiousness				
Decreased libido				
Mood Sings				

SNO	Ht(cm)	Weight	BMI	SNO	Ht	Weight	BMI	SNO	Height	Weight	BMI

1	155	52	21.6	41	156	67	27.53	81	151	49	21.49
2	160	81	31.6	42	155	54	22.48	82	153	45	27.59
3	150	57	25.3	43	120	63	43.75	83	157	68	22.27
4	156	47	19.3	44	158	55	22.03	85	154	62	30.44
5	158	84	33.6	45	152	55	23.81	86	158	76	24.17
6	148	51	23.23	46	168	80	28.34	87	164	65	24.56
7	150	50	22.2	47	158	70	28.04	88	155	59	28.19
8	150	37.5	16.7	48	149	53.5	24.10	89	153	66	21.60
9	150	57	25.3	49	147	*85.5*	39.57	90	161	56	26.56
10	155	*76*	31.63	50	149	53	23.87	91	154	63	26.89
11	148	40	18.26	51	152	70	30.30	92	167	75	40.00
12	140	52	26.53	52	155	48	19.98	93	150	90	26.22
13	147	47.5	21.98	53	150	51	22.67	94	155	63	22.15
14	151	62	27.19	54	155	44	18.31	95	159	56	30.82
15	156	65	26.71	55	150	53	23.56	96	156	75	23.74
16	156	61	25.07	56	152	58	25.10	97	148	52	31.22
17	145	49	23.31	57	155	48	19.98	98	155	75	21.78
18	144	64	30.86	58	150	71	31.56	99	150	49	25.87
19	*161*	65.5	25.27	59	162	56	21.34	100	158.5	65	17.71
20	149	61	27.48	60	152	61.5	26.62	101	154	42	25.55
21	160	62	24.22	61	157	57.5	23.33	102	159.5	65	21.76
22	144	35	16.88	62	152	67	29.00	103	159	55	25.00
23	154	51	21.50	63	144	54.5	26.28	104	160	64	22.10
24	153	*93*	39.73	64	154	37	15.60	105	167.5	62	24.89
25	165	70.5	25.90	65	168	67	23.74	106	152	57.5	23.23
26	152	*87*	37.66	66	166	66	23.95	107	158	58	27.85
27	148	45	20.54	67	148	40	18.26	108	148	61	20.93
28	152	60	25.97	68	160	65	25.39	109	153	49	21.98
29	140	55	28.06	69	163	58	21.83	110	147	47.5	22.34
30	149	50	22.52	70	163	62	23.34	111	182	74	28.95
31	153	50	21.36	71	164	59	21.94	112	151	66	18.82
32	155	68	28.30	72	152	60	25.97	113	163	50	24.80
33	149	54	24.32	73	166	71	25.77	114	162.5	65.5	32.46
34	145	54	25.68	74	158	63	25.24	115	152	75	22.03
35	150	60	26.67	75	149	52	23.42	116	158	55	25.24
36	160	50	19.53	76	164	65	24.17	117	158	63	29.63
37	155	75	31.22	77	167	64	22.95	118	151.5	68	28.64
38	158	45	18.03	78	152	76	32.89	119	158	71.5	16.53
39	150	65	28.89	79	156	69	28.35	120	165	45	28.35
40	165	68	24.98	80	160	58	22.66				